VOL. XXXI. No. 3 MARCH 1946

MECCANO MAGAZINE

THE WORLD'S LARGEST SHOVEL

6D.

SECRET BICYCLE

A short story about Nazi-occupied Holland

When the Nazis occupied Holland, things became very difficult for Dutch cyclists, and they had a hard job keeping their machines on the road. For one thing, there were no rubber tyres — M. Oosterwijk, an enthusiastic cyclist who told us this story recently, had eventually to fit *wooden* tyres to his B.S.A.— and he had to obtain a permit even for those. But it still kept going. (B.S.A.s are tough!) Then, as the war went on, the Huns started a cycle-grabbing campaign. But they didn't grab M. Oosterwijk's — he took his faithful B.S.A. to pieces and hid the parts away. Under the living-room floor was one hiding-place! On the morning of May 5th the news of the German surrender was announced and M. Oosterwijk joyously re-assembled his B.S.A. and started to ride to his office in Rotterdam. Then came tragedy! He was waylaid by four armed Nazis and forced at the pistol point to hand over his B.S.A. What a terrible piece of luck after such efforts to save his cherished cycle! No wonder that M. Oosterwijk, like so many cyclists throughout the world, is anxious to get hold of another B.S.A! But soon there will be one for everyone everywhere. So keep in touch with your B.S.A. dealer — he can help you.

B.S.A. CYCLES Ltd. BIRMINGHAM, 11

Next Month: "THE FRENCH AIRCRAFT INDUSTRY." By J. W. R. Taylor

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With the Editor

Diamonds!

The article on diamonds that appears on page 100 of this issue is a reminder of the amazing romance that has been associated with this stone throughout the ages. Although diamonds are only carbon transformed into crystal in an almost miraculous way, they have always ranked highly for their wonderful brilliance. Many lives have been sacrificed in desperate efforts to gain possession of large stones. Most of the world's historic diamonds came from India, the chief source of the stone in ancient times. It was from there that such gems as the Orloff and Pitt diamonds came, as well as the Kohinoor, now in the possession of the British Crown, and there are legends of an immense diamond of nearly 800 carats possessed by the Great Moguls of India.

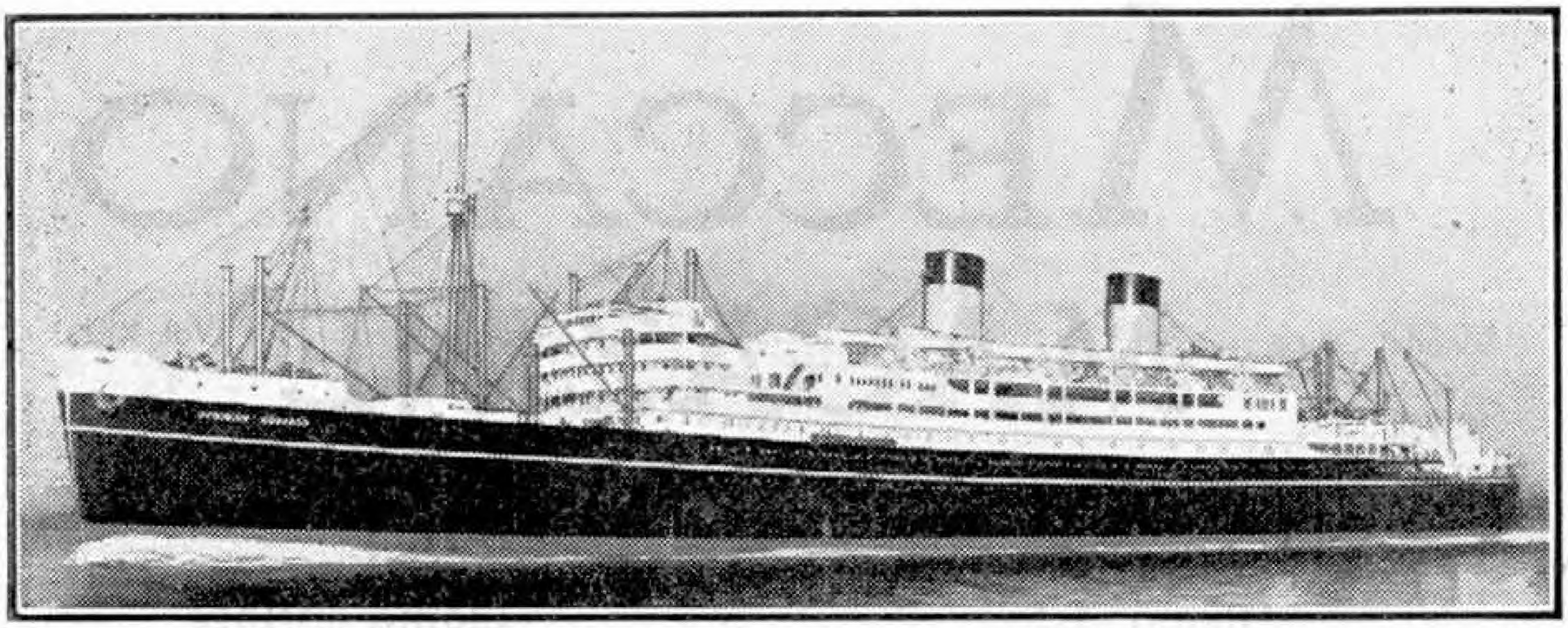
One of the most remarkable features of the diamond is that its value continues to increase, even with the discovery of the rich diamond fields of South Africa and Brazil, both of which now far outshine India as diamond producers. It seems as if the glitter of the stone will exercise a perpetual fascination, and recent discoveries of diamonds even larger than the famous stones of history have increased the interest. For instance, there was great excitement throughout the world 40 years ago when an enormous piece of crystal weighing over 3,000 carats, or nearly 1½ lb., was found in the Transvaal. This was the largest diamond ever discovered.

X-rays have enabled us to look below the surface and to discover how the carbon atoms are packed in order to give the amazing brilliance and hardness of the gem, but efforts to reproduce the arrangement have produced only minute fragments of diamond, and that at immense cost.

Liquid Springs

For many years liquids have been used for stopping motor cars, and to-day there is promise of their use for holding them up as well. Hydraulic brakes are familiar to every reader. Now hydraulic suspension is promised, and this has special interest in that it is a gift from the aeroplane industry. The new form of suspension began with the Dowty liquid spring system used for aircraft landing gear, and the substitution of these liquid springs for the familiar leaf springs of motor cars has given very satisfactory results in trials.

This Month's Articles



The "Dominion Monarch," which has the argest refrigerating installation yet installed in any ship. The illustrations to this article are by courtesy of J. and E. Hall Ltd.

The Refrigerated Ship

By Arthur Nettleton, F.R.G.S.

AFTER their war service in various capacities, the ships of the "Empire Food Fleet" are now reverting to their peace-time jobs, and new vessels are being built to expand this fleet. They are the refrigerated cargo ships specially built and equipped for the transport of perishable foodstuffs, particularly fruit and meat. Without these ships, the world transport of such food would be impossible.

The necessary low temperatures are obtained and maintained aboard refrigerated ships by what is called the "vapour compression" system. If we compress and cool a gas it becomes a liquid, and during this condensation the heat that is generated by the compression can be carried away by some cooling medium. Aboard refrigerated ships, the condensing apparatus is cooled with sea water The next step is to release the pressure, an operation which causes the liquid to evaporate and become a gas once more. But to do this it must take in as much heat as it gave out to the cooling medium during the process of condensing. This heat it absorbs from its surroundings at a very low temperature.

The gas used, called the refrigerant, is usually carbon dioxide. Ammonia, methyl chloride, and Freon are other refrigerants, but these are used in refrigerating plant on land rather than on cargo ships. The heat which the refrigerant needs for its conversion from a liquid to a gas is taken from brine circulating over the plant, or from air circulated over it by a power-driven fan. Thus the brine or air is reduced to a very low temperature. It is then passed through cooling appliances in the holds and the 'tweendeck spaces of the ship.

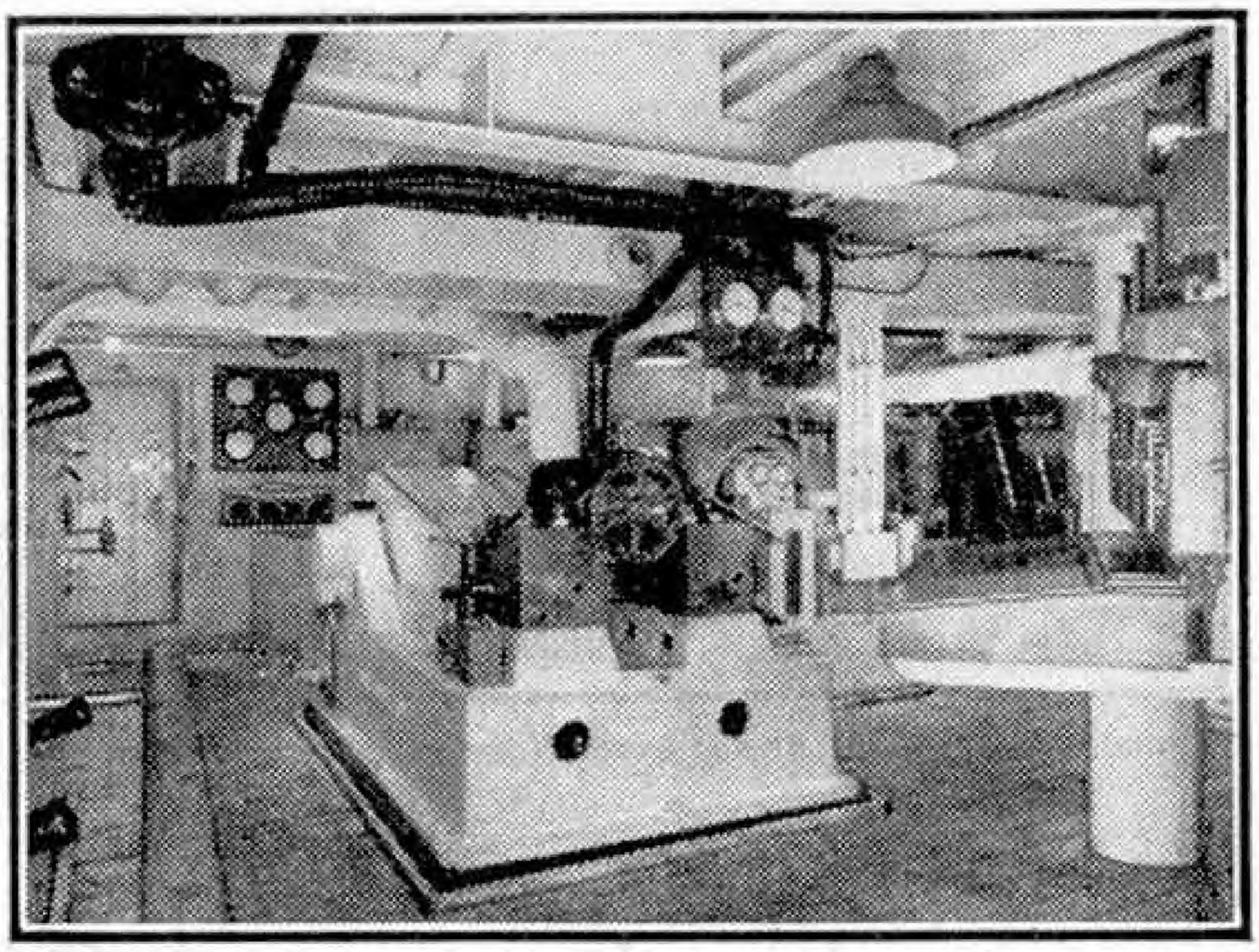
The whole process is under control, so that the temperature can be regulated as required. Moreover, the refrigerant is used again and again: it circulates continually while the plant is operating.

There are two methods of preserving meat during its transport across the world. It may be either frozen solid or merely chilled. In the latter event it is kept at only a few degrees below freezing-point, and it does not freeze and become hard. In normal times meat brought to Britain from the Argentine is usually chilled, but most of the consignments from Australia and New Zealand are frozen. During the war, however, every meat cargo consigned to ports in the United Kingdom from overseas was brought in the frozen state. One reason for this was that bigger weights could then be carried. Whereas meat which is only to be chilled must be in carcase form, and must be hung with air spaces between the carcases, meat for transport in the frozen state can be boned and rolled for storage. It thus takes up considerably less space.

The first experiments in marine refrigeration were carried out in the 1870s. The pioneer of this nowadays highly important engineering industry was Thomas Sutcliffe Mort, a Lancashire man who emigrated to Sydney, New South Wales, and there set up plant for the

production of artificial ice. In 1876 he tried to instal such plant aboard a ship, and although this venture failed, the idea was taken up and improved upon by other inventors.

Exactly which ship was the first to carry meat in a refrigerated state is not definitely decided, but the "*Dunedin*," a British ship, was one of the earliest vessels to be equipped with steam-driven refrigerating plant. In 1877 the "*Paraguay*" carried a cargo of frozen meat to Rouen from Buenos Aires; the first such cargo to reach London direct was brought by the "*Strathleven*" in 1880. But none of these ships was a refrigerated vessel of the type used to-day.

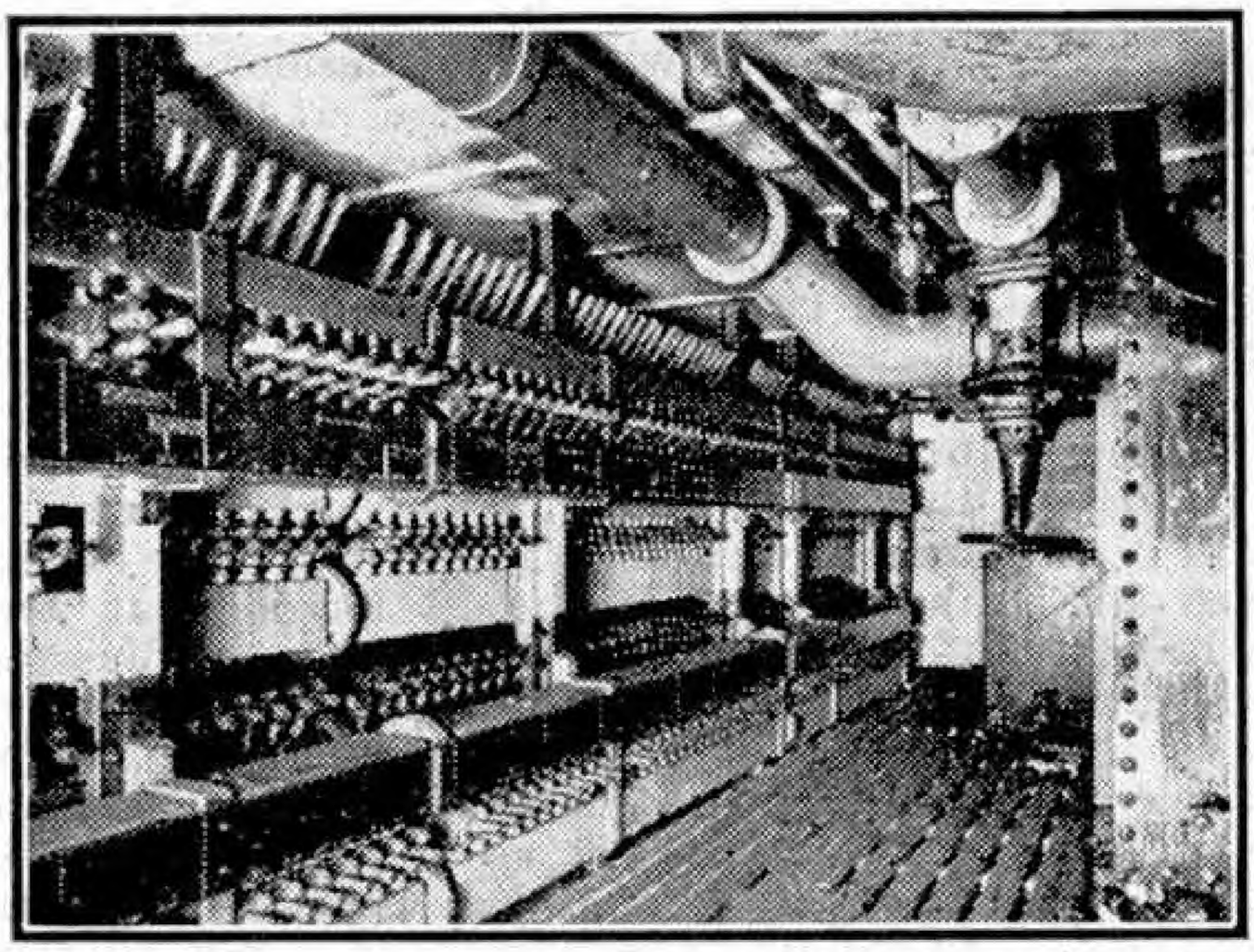


The refrigerating engine room aboard the "Dominion Monarch."

A big step forward was made when Governments began to pay subsidies to shipbuilders for the construction of refrigerated ships. The first moves in this matter were made in Australia and New Zealand, where enterprising cattle breeders foresaw that such vessels would greatly extend the market for meat. They realised that if beef and mutton could be carried across the world, big new markets would be opened up. They worked out the costs and found that meat selling wholesale at between 1½d. and 2d. per lb. in Australia would fetch 6d. per lb. in London. As the cost of transport was about 3d. per lb., there was a margin of profit quite large enough to make the venture worthwhile. One of the first consignments of frozen meat from "Down Under" to London was sent as a Christmas gift to poor people, and a quantity was also sent to Queen Victoria.

Experimental work is still going on, and shipbuilders have continued to help by building faster vessels. Refrigeration cannot be continued indefinitely. The longer the duration of the voyage, the longer the refrigerator plant has to be kept running—and this means higher upkeep costs.

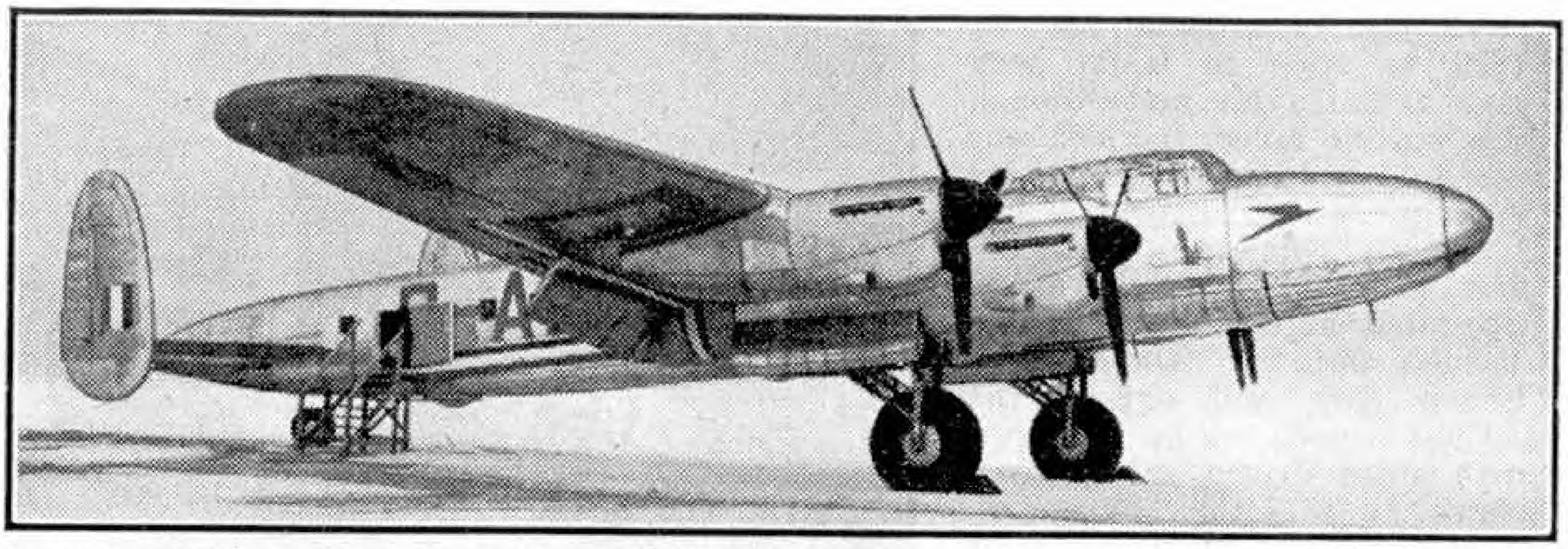
Moreover, in the banana trade particularly, the ships often put up a good mileage before they set out to bring the fruit to British ports. They make a tour of small islands in the tropics, gathering their cargoes from these places. It all has to be done to schedule. The fruit has to be gathered before the refrigerated ship arrives. Delay of only a few days may upset the time-table and ruin the enterprise, since other consignments will be waiting at other small ports, where they may go bad unless promptly placed in the refrigerated chambers.



Part of the brine control room in a big refrigerated meat carrier.

What marine refrigeration engineers and scientists are hoping to do, during the next few years, is to perfect ways whereby fruits unknown to Britain can be brought to our tables. There are many luscious tropical fruits which have not yet been successfully transported over long distances.

The day will come when a means of transporting them to British ports and distributing them will be found.



A modern British air liner. Avro "Lancastrian" of British Overseas Airways Corporation, by whose courtesy this photograph is reproduced.

Illusions and Disillusions

By C. G. Grey

FEW people, I imagine, ever quite forget that shock of disillusionment which they felt when they first were told, or discovered, that Santa Claus does not exist. And yet, life is like that. As one grows up one's illusions go pop, one after the other. But we learn, if we are wise, to profit by their explosions.

The great thing is to learn the lessons and to avoid taking on fresh illusions. One thing one learns is that in any line of business—surgery, chemistry, engineering, architecture, medicine, bookmaking (of any kind), horseracing, and especially aircraft design—one can always find two experts of equally high standard to contradict one another flatly. That is particularly true, in these politically-minded days, of ideologies, sociologies, economics, finance and such things. So remember the old saying, "Believe half of what you see and nothing of what you hear"—and that takes in what you read, including this article—until events prove who or what is right. And then go on wondering whether it is right after all. Does 2 and 2 really make 4? Mr. Einstein would probably prove that it is only relatively so.

One of the first principles ever laid down by aircraft designers, for the benefit of future generations, was the law—"The weight of an aeroplane increases as the cube of the dimensions." In other words, if you double the measurements of an aeroplane all over, it must weigh eight times as much. It seems fairly obvious. If you make it twice as wide and long, without altering anything else, it *must* weigh four times as much. And then if you make it twice as deep it does come out eight times as heavy.

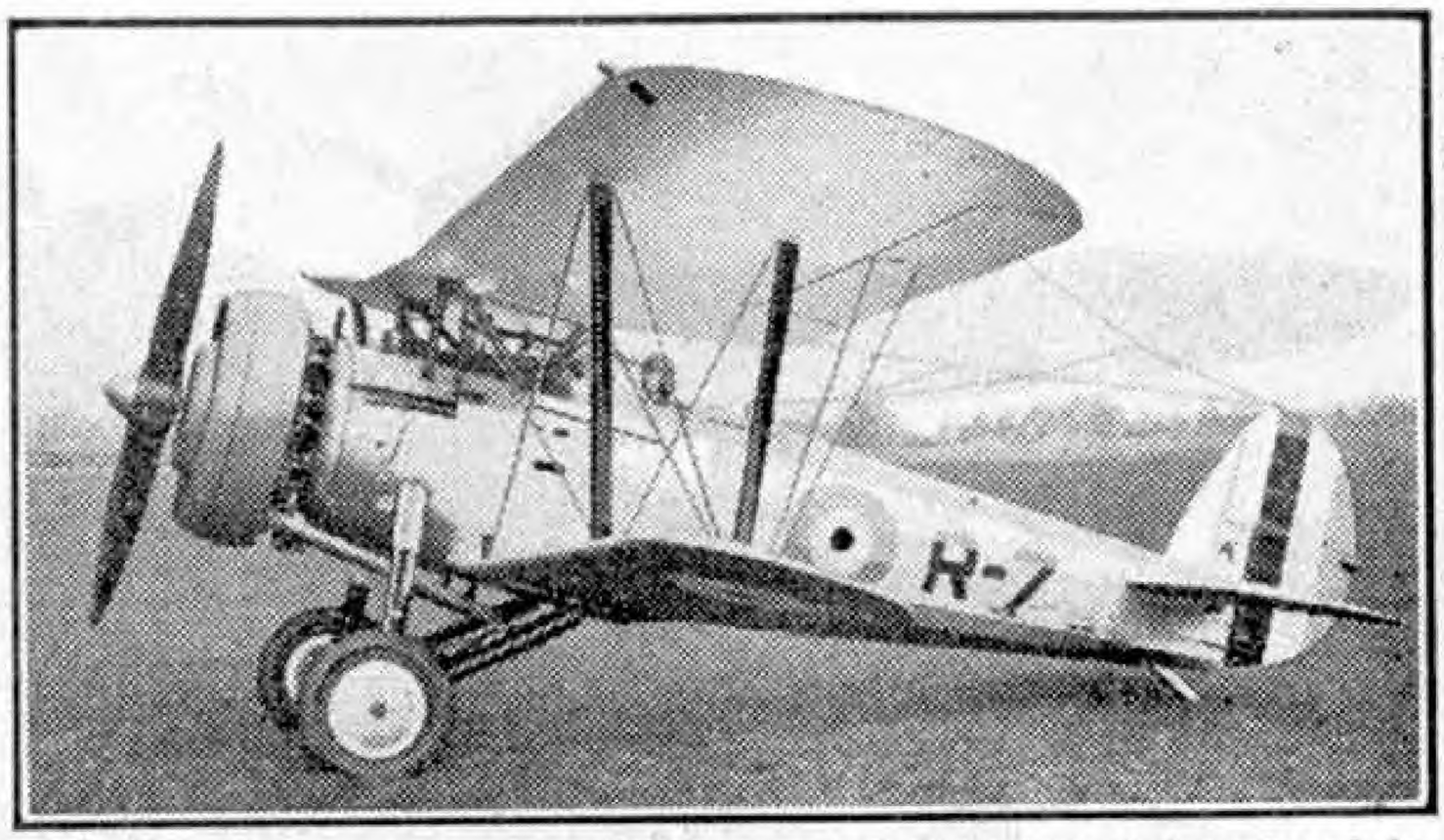
But the whole thing is an illusion, because it assumes that you will use the same system of construction, without hollowing anything out, or replacing solid members with tubes or lattice work. And it assumes that you will use the same materials, instead of using steel or aluminium, or the still lighter magnesium, to replace wood. I merely give that as a simple example of a very early illusion which was soon abolished in practice.

When the aeronautical engineers of that day found that they could build bigger aeroplanes for the same weight they started out with fresh illusions. One lot said that they could see no limit to the size to which aeroplanes could be built. They argued that a thing the size of the "*Aquitania*," a big ship in those days, could be made to fly. I suppose that an illusionist of that sort would say that the "*Queen Elizabeth*" could equally be made to fly. Another lot stated that there were theoretical aerodynamic and structural reasons why aeroplanes could not be bigger than a certain size. I forgot what size they fixed, but it was equally an illusion.

What bursts those particular illusions are mere practical considerations. For example, what is the good of building an aeroplane as big as a steamship unless there are enough passengers and freight to fill it? And why build a big aircraft that can only be filled once a day when

the public want a service such as the Luddington Brothers ran between Washington and New York in 1930 or so, with the motto: "Every Hour on the Hour"? Or perhaps every quarter of the hour would be better still.

Then there are considerations of the enormously thick runways needed to carry the weight of these huge craft, and the length of runways which they need from which to take off or on which to land. And think of the size of shed needed to cover them when being repaired or overhauled.

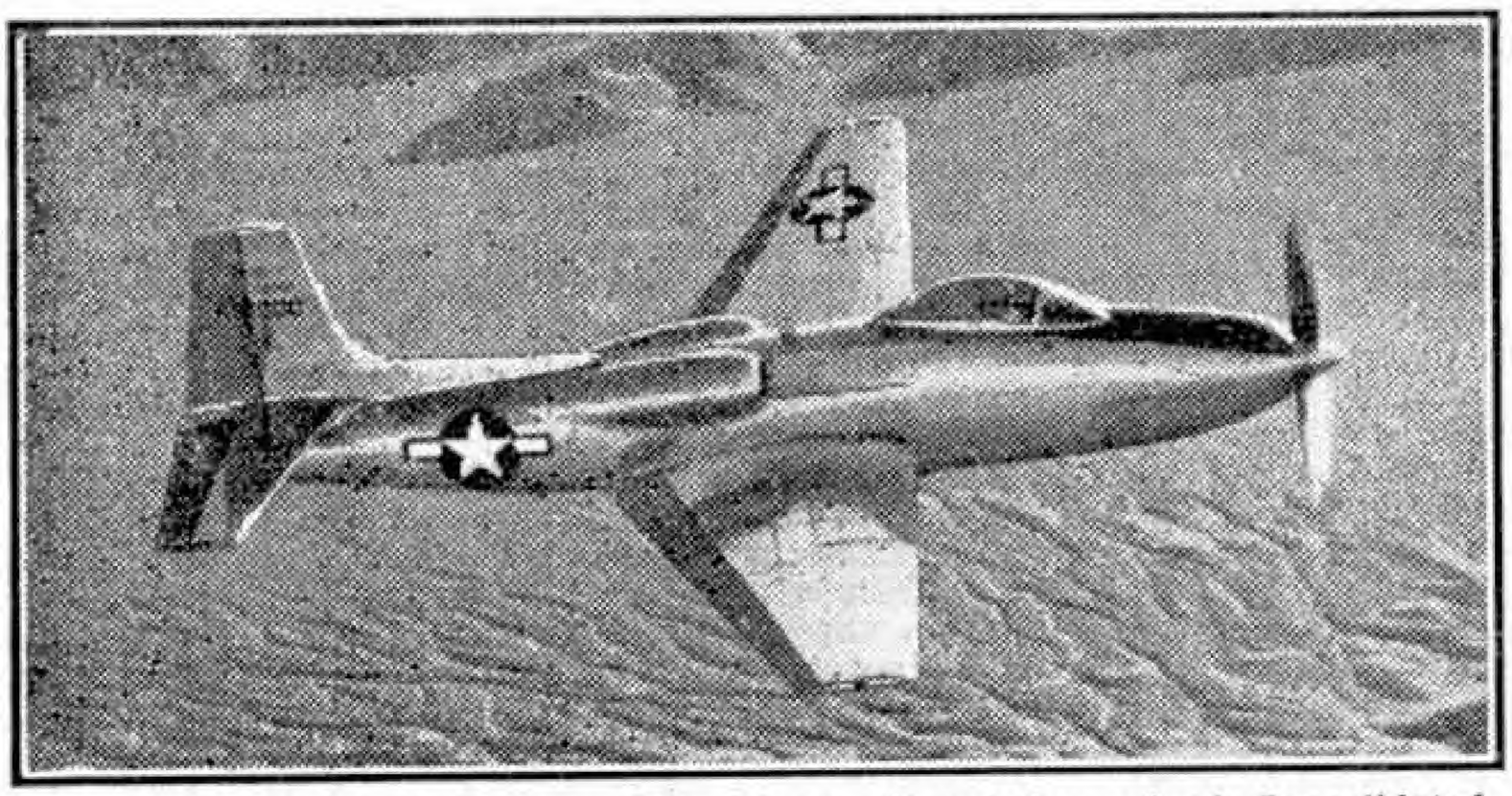


The "Bulldog" single-seat fighter, a noted Bristol type introduced in 1927. Nearly 500 of these machines were built. Photograph by courtesy of The Bristol Aeroplane Co. Ltd.

Another disadvantage is the weight of the undercarriage they need and the cost of carrying it about in the air where it does nothing to justify its existence. Whether a machine has an ordinary undercarriage or a tricycle undercarriage or a train of smaller wheels, the mechanism has to be strong enough to carry the weight above it, so it has to be of immense strength and consequent weight itself. So there goes the illusion that an aeroplane of normal type, or what we consider a normal type to-day, can be made of unlimited size.

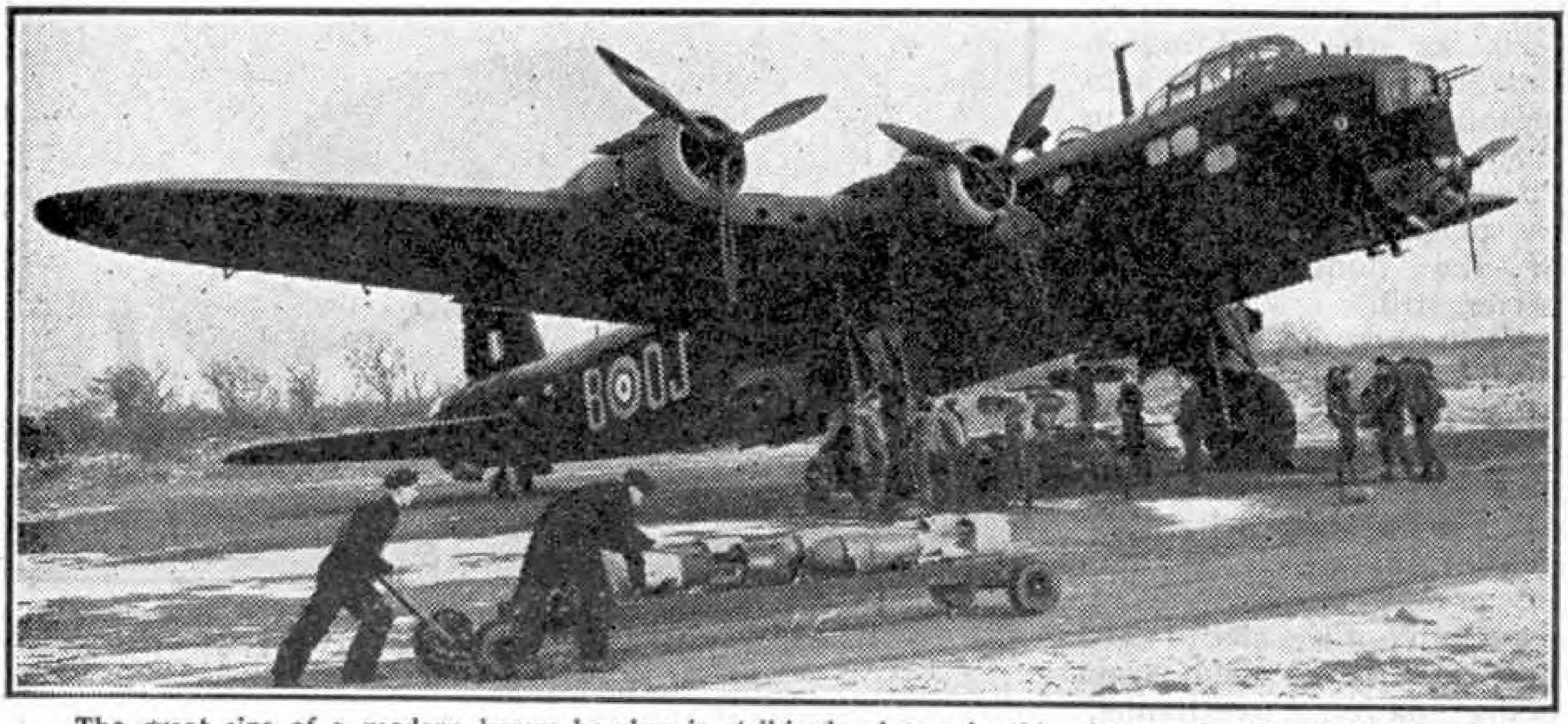
Few things are more amusing than an argument among aero engineering specialists (or experts) on this subject. One of the most ingenious ideas that I have heard put forward as a way of getting over the difficulty of the weight of the undercarriage was that the aircraft should have no undercarriage, but should be launched from a cradle on a high-speed power-driven truck, and that it should alight on skids which would be extruded (pushed out) from the bottom of the machine. Which sounds pretty till one considers that the weight of the skids and the mechanism to extrude them would not be much less than that of an undercarriage of one sort or another.

When they get so far the advocates of the flying liner are apt to switch over and say that perhaps after all the flying-boat is the best solution of the problem of the giant aeroplane. Then the experts who favour the landplane, as against the seaplane, argue that the weight you save by not having an undercarriage has to be put into the bottom of the boat to stand smacking the water when it alights—apart from which it may sit down on a submerged log or a lump of wreckage. Besides, they say, the hull of a flying-boat, if it is to be seaworthy, cannot be made as good a streamline shape as can the fuselage of a landplane. Which sounds fair enough when one compares the shape of the best "Sunderland" (let us say) with the shape of a "Lancastrian."



A fighter aircraft of to-day. The jet-propelled twin-engined Consolidated-Vultee XP-81, claimed to be the first machine to fly with a gas turbine engine designed for propeller drive. An article on this machine will appear in next month's "M.M."

Arising out of that there is the argument about whether multi-engined landplanes are safer than seaplanes (that is to say flying-boats) for long trans-oceanic journeys. The



The great size of a modern heavy bomber is strikingly shown in this picture of a Short "Stirling."

landplane people say that modern aero-engines, if properly maintained and checked and examined, never stop unless switched off or throttled back, so there is no need to worry about what would happen if one of them came down in the Atlantic. That is an illusion, for a start, because the best of engines do stop once in a while. And although a modern four-engined aeroplane can fly safely on three, or even two, engines, there is a chance that all engines may stop at once, or one after the other. Think of the number of multi-engined aircraft which have been crashed in this recent war, or have disappeared without trace in the sea, not necessarily the greater oceans.

The flying-boat people will then point out the added safety of a proper sea-going hull if the engines let the aircraft down. To which the landplane people will reply that this argument also is an illusion, because no flying-boat hull, however big, could float for more than a few minutes in a full Atlantic gale, or a gale on any other ocean or sea. The flying-boat answer to that is that the chances of four engines letting one down are pretty remote, and that full gales at any one spot on any one day are not frequent. And so the odds against engine-failure, or any other reason for a forced alighting, happening at the spot and at the moment when a full gale is blowing, are very long. On the other hand, if an aircraft has to come down out at sea in any ordinary weather, then a flying-boat will float for weeks—at any rate it will give plenty of time for a sea-going ship to arrive and rescue those on board; whereas a landplane would be bound to sink in, at most, a few hours. Generally they sink in a few minutes.

Another fierce argument, with illusions on both sides, is about the economy of running the terminal stations of landplanes and seaplanes. The landplane people say that the inconvenience of taking passengers off in launches to flying-boats, and the cost of operating the launches, outweigh all other advantages. The flying-boat people say that a land aerodrome takes up hundreds of acres of valuable farm land and the runways cost thousands of pounds, whereas they get their aerodromes for nothing. Moreover, big aerodromes have to be miles away from the cities they serve—most of them are 12 or 15 miles out—whereas harbours big enough for flying-boats are on the door-step of most big cities.

The landplane people say that flying-boats cannot alight on or take off from a big sea. The flying-boat people retort that during the week of gales in October 1945 the B.O.A.C. flying-boats ran their services with 80 per cent. regularity from Poole Harbour, whereas the B.O.A.C. landplanes at the huge airfield at Hurn, a few miles away, could not operate at all.

So you see how dangerous it is to have fixed opinions on anything, for opinions are, as often as not, simply illusions.

Now let us consider the engines used in aircraft. More beloved illusions about them have probably been destroyed that even the illusions about the aeroplanes themselves. The reason is that the need to squeeze more and more power out of an engine of a given weight and size has urged the Government and the capitalists concerned to spend more and more money and man-hours on research and experiment.

In the very early days of flying, say about 1908 and 1909, naval engineers and electrical engineers had already made considerable progress in the use of steam turbines. The first public appearance of the steam turbine in a boat was at Queen Victoria's Diamond Jubilee Review of the Royal Navy at Spithead in 1897, when the Hon. Charles Parsons in his little boat the "*Turbinia*" darted out, illegally and unannounced, from behind a big ship, chased the Navy's crack destroyer between the lines of ships, caught it, passed it, and disappeared in the distance, leaving the Navies of the World shaken to the core. The event has a particular aeronautical interest because one of Parsons' chief assistants in the development of the steam turbine was Horace Short (now dead), who was the eldest of the three Short Brothers who later built up the famous sea-plane firm.

The seafaring people, Royal Navy, foreign Navies the merchant shipping, took a long time to adopt turbines, for sailors don't care about novelties. But by 1909-10 some of the brainier, or more prophetically-minded, people in aviation were thinking about turbines driven by gas-jets. I remember W. H. Sayers, then building an aeroplane at Brooklands, later my assistant on "*The Aeroplane*" and still later concerned with Radar in the R.A.F., telling me (in 1910 at latest) that there was no difficulty in making a gas-turbine, except that after running for half a minute the blades burned off the turbine-rotor and stator.

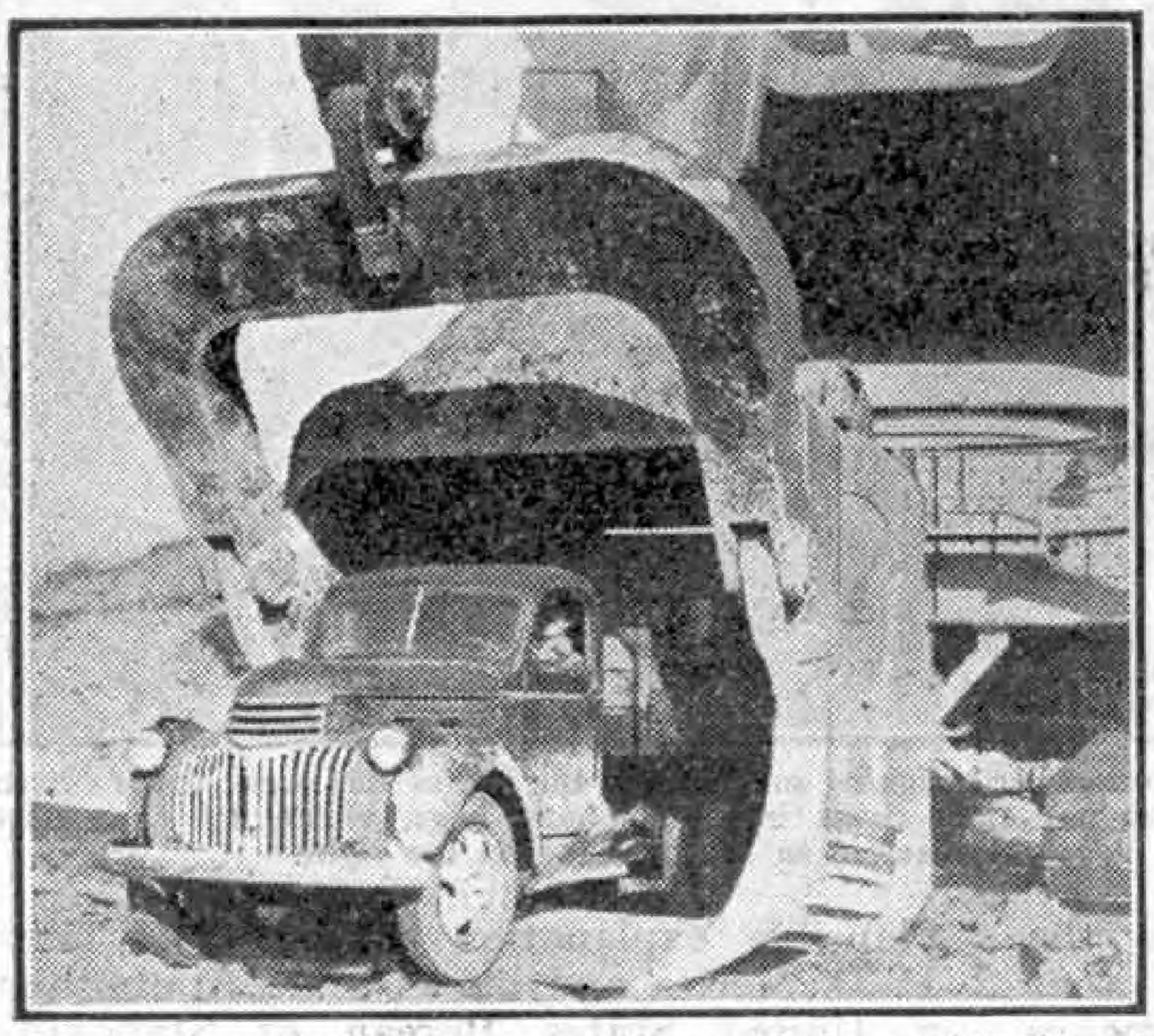
He and those who thought like him were told that the notion of a gas-turbine was an illusion. They replied that the problem was up to the metallurgists to produce a metal for the blades which would not melt in the fierce blast of gas. And now you see we have got our gas-turbines and a speed of nearly 700 m.p.h. The people who have been disillusioned are the engine-makers who believed that for all eternity power for gas-driven vehicles would be provided by engines with pistons and connecting rods and crankshafts.

When you come to think of it, could there be anything sillier than having a certain amount of energy in the form of (*Continued on page 128*)

The World's Largest Shovel

THE largest shovel in the world is a gigantic electric one that can lift 50 tons of material at a single dip. It is employed in stripping away earth covering deposits of coal near Georgetown, Ohio, in the United States.

Some idea of the immense size of the shovel is given by our cover, which shows it in use. The motor cars seen alongside of the giant are simply dwarfed by it. The dipper, which does the actual shovelling, is big enough to act as a garage for a Chevrolet car, as shown by the photograph reproduced on this page, and the car has plenty of room to spare on each side after being backed in. The capacity of the dipper is 35 cu. yds., so that it holds enough earth to fill a fair sized room; while two dips are sufficient to pick up enough to fill a standard American 100-ton railway truck.



A motor car inside the huge dipper of the world's largest shovel. This photograph, and the one on which our cover is based, are reproduced by courtesy of the Marion Steam Shovel Co., Ohio, U.S.A.

The entire machine weighs nearly 1,500 tons and its size is impressive, but it is even more startling to learn how far away and how high it can deliver the material picked up. It could in fact dig out soil from the ground and pile it on the top of a seven storey building 240 ft. away! It is operated electrically, and the plant installed in it produces sufficient power to meet all the needs of a community of 3,000 people. When it was transported from the works of the Marion Steam Shovel Company at Marion, Ohio, where it was built, 50 giant American railway trucks were required to carry its parts.

During the war we have learned something in Great Britain of open cast coal mining, in which the earth and clay over a coal deposit near the surface is removed by means of excavators and power shovels so that the coal itself is exposed ready to be dug out. Mining of this kind has been carried on in the United States for many years, and the output of open cast coal increased during the war, reaching 80,000,000 tons during 1943, with a further increase in the following year.

The shovel seen on our cover is one of a series designed specially for stripping coal of heavy overburden, as the earth covering is called, and it has been so successful that in addition to its use in working new mines it has been employed in re-opening old ones that could not profitably be worked with smaller equipment. The overburden at the mine where the shovel described and illustrated in this article is working ranges from 25 ft. to 75 ft. in depth.

The giant has many outstanding features. Of these one of the most interesting is the system of hydraulic jacks, controlled electrically and automatically, that keeps the frame of the machine level while travelling as well as when digging. Equipment of this kind is necessary, for the shovel removes all the overburden and then has to travel on the surface of the coal, which may be far from level. No matter how the ground slopes, or what irregularities are passed over, the hydraulic equalising and levelling jacks automatically provide compensation. In addition, the creeper tracks on which the giant moves swivel independently, so that the shovel is easy to manœuvre and conforms to the coal surface without imposing undue strains.

Another feature is the design of the front end of the machine. The weight of the boom has been reduced by mounting the machinery directly operating the shovel on the gantry above the cab.

Cellophane Bags for Frozen Rivets

Saving Time in Aircraft Construction

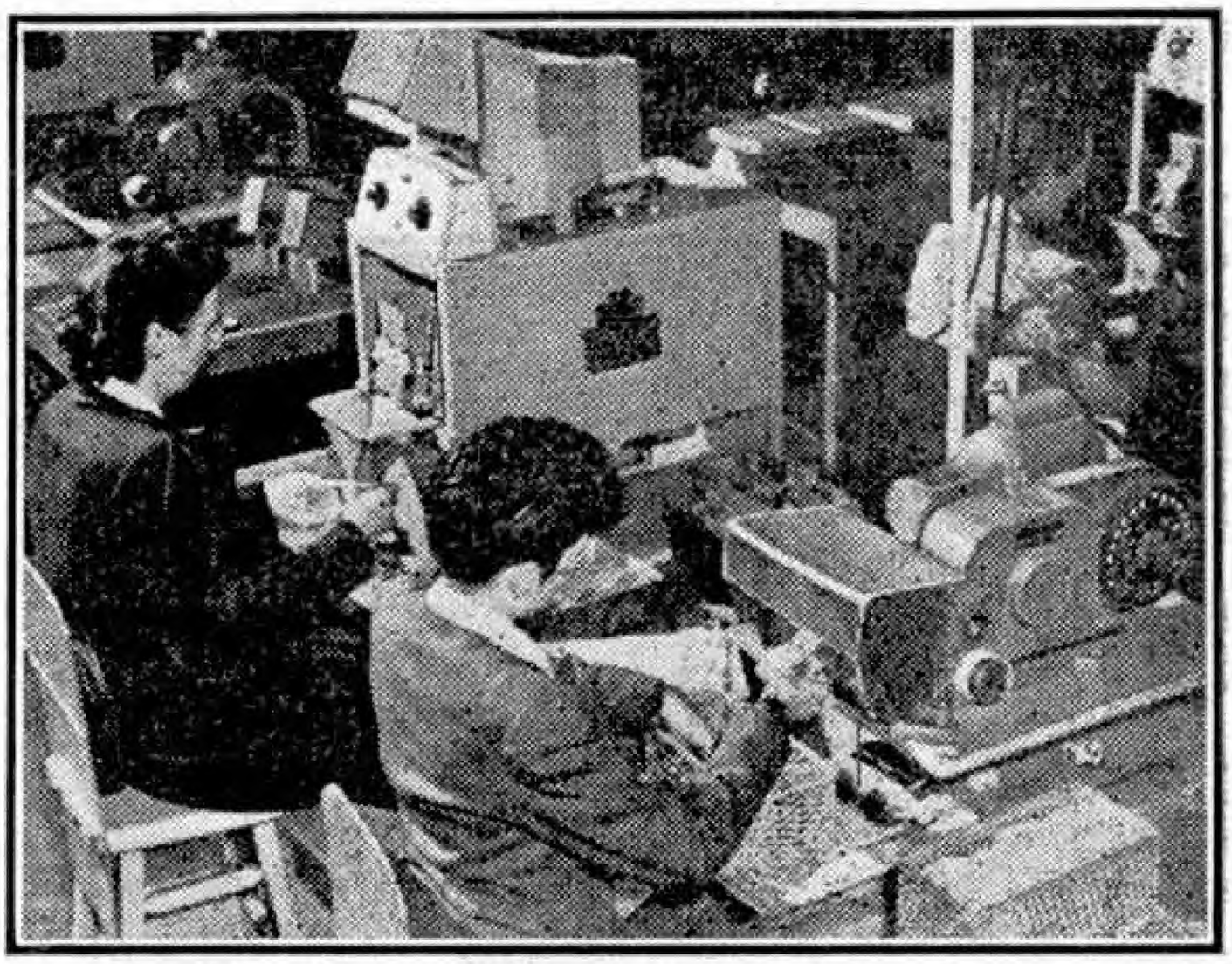
By M. Lorant

ICE-COLD rivets in cellophane bags are a favourite dish for aircraft workers, who have them served from portable freezer cabinets resembling the familiar ice-cream wagons. This war-time application of the thin, cellulose film has saved bomber manufacturers time and money formerly wasted in re-sorting, re-heating and re-cooling aluminium alloy rivets that had become too warm to be used.

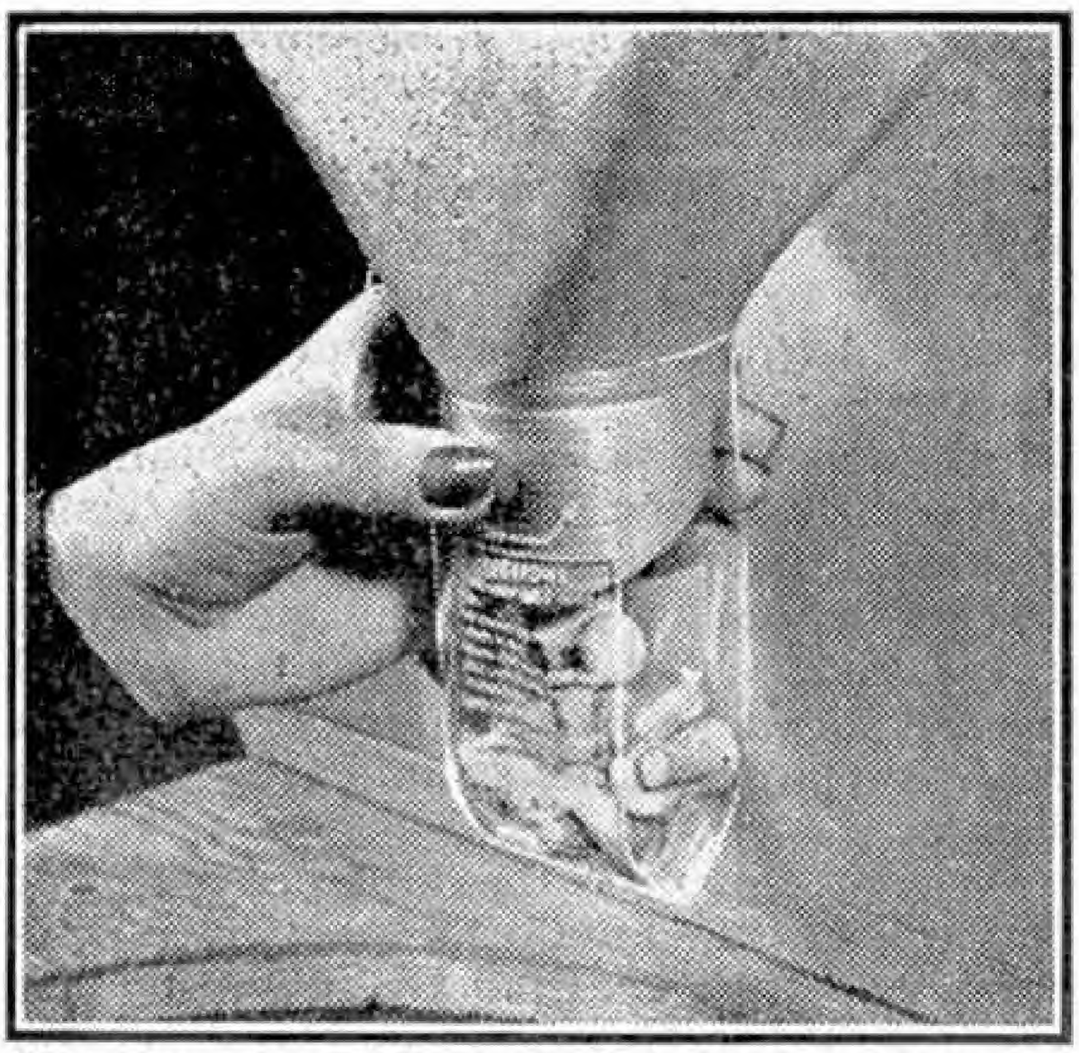
Unlike steel rivets, which must be hammered while they are hot, aluminium alloy rivets must be driven while they are very cold. They are first heat-treated at above 900 deg. F. and then quenched in oil or water, following which they are further chilled in a freezing machine to about 45 deg. below zero. In this super-cooled state they are quite malleable and can be easily driven. As they warm to room temperature, an aging process takes place that increases the strength of the metal far beyond that existing before heat-treatment, but makes them too brittle to be driven easily.

The increase of strength through aging was unknown in the field of metallurgy until it was discovered in the aluminium alloys about 1903, and it remained without plausible explanation until 1919. Then P. D. Merica and his associates published a United States Bureau of Standards report on their work. Their theory, now generally accepted, is that when the alloy is heated, the particles of the alloying metals, such as copper or magnesium, are driven into supersaturated solid solution, as it is called. The metal can be held in this state by quenching, which in effect freezes or locks the molecules in place. When the metal is allowed to warm up, the mobility of the atoms and molecules is increased. The alloying metals then come out of solution and are precipitated in the form of copper aluminide or magnesium silicide. It is the presence of these extremely fine precipitated particles that gives the metal its increased strength.

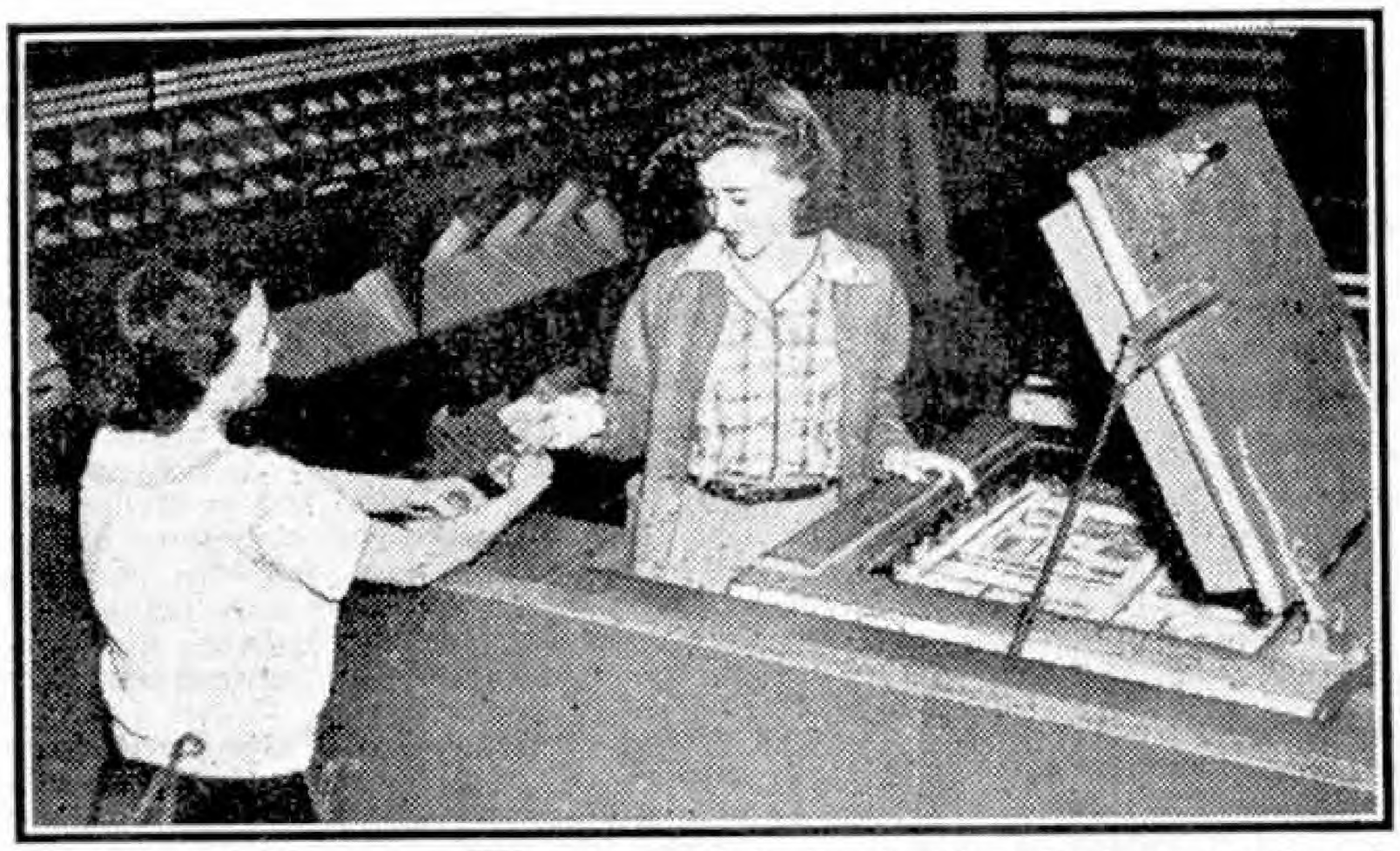
It has been calculated that the maximum hardness of 4.5 per cent. copper alloy is reached when the particles of copper aluminide are one ten-millionth of an inch in diameter. If the temperature becomes too high, or the metal gets too old, the particles increase in size beyond that required to give the greatest strength, and



An automatic weighing machine on the left of this scene drops frozen aluminium alloy rivets into cellophane bags, which are then heat sealed in the machine on the right.



A close-up view of the packaging of frozen aluminium alloy rivets.



Handing out aluminium rivets, wrapped in the double cellophane envelope in which they have been frozen.

the metal becomes softer. This does not occur during the ordinary life of most aluminium articles.

With ordinary methods of handling, airplane rivets of aluminium alloy have to be driven within half an hour after they are removed from the freezer compartment. Those unused in this time are tossed into a box, with many other sizes, and all have to be re-sorted and then given another heat-treatment. Keeping them in bags made of Du Pont cellophane insulates them, with the result that rivets taken out of the freezer cabinet, but left in the cellophane envelope until actually required, can be used as long as an hour or an hour and a half later, giving an increase of 100 to 200 per cent. in their drivable life. Furthermore, since each bag contains only rivets of the same size, the returns are less likely to become mixed, and the time necessary for re-sorting is reduced.

One plant reports that whereas 15,600 lb. of rivets formerly had to be re-sorted each month, the use of cellophane bags has cut this figure to 600 lb., with an accompanying reduction in waste from 50 per cent. to 1½ per cent. This saved the plant nearly £2,000 per month, in addition to eliminating much of the expensive re-heating and re-cooling.

During the war Consolidated Vultee plants in San Diego, U.S., producing "Liberator" B-24 bombers and "Catalina" and "Coronado" flying boats, used several hundred thousand cellophane envelopes every month, with very substantial savings. In some plants using this method the rivets are packed in the bags by machines of the type used to package beans or rice. In these the small rivets are fed through a funnel-shaped device, and one or two ounces go into each bag or envelope. The packaging is done after the quenching, and the sealed envelopes are then sent to the freezer. The operator at the riveting station takes a bag of rivets out of the portable freezer as she needs them. The freezer is seen in use for this purpose in the upper illustration on this page. Each rivet is kept in the bag until the actual moment when it has to be driven.

Cellophane is no novice in the packing of products at sub-freezing temperatures. In the field of quick-frozen foods it has been used almost from the start, and its performance at low temperatures qualified it as the ideal material to use in the new field of frozen rivets. As cellophane is light, strong and easy to handle, it is possible to use a double bag, the dead air space between the walls of cellophane acting as an excellent insulator, so that the rivets are kept cold for a longer period after they are removed from the portable cold cabinet.

Frozen aluminium alloy rivets remain cold enough to be driven for an hour or more when kept in their cellophane bags.

Railway Notes

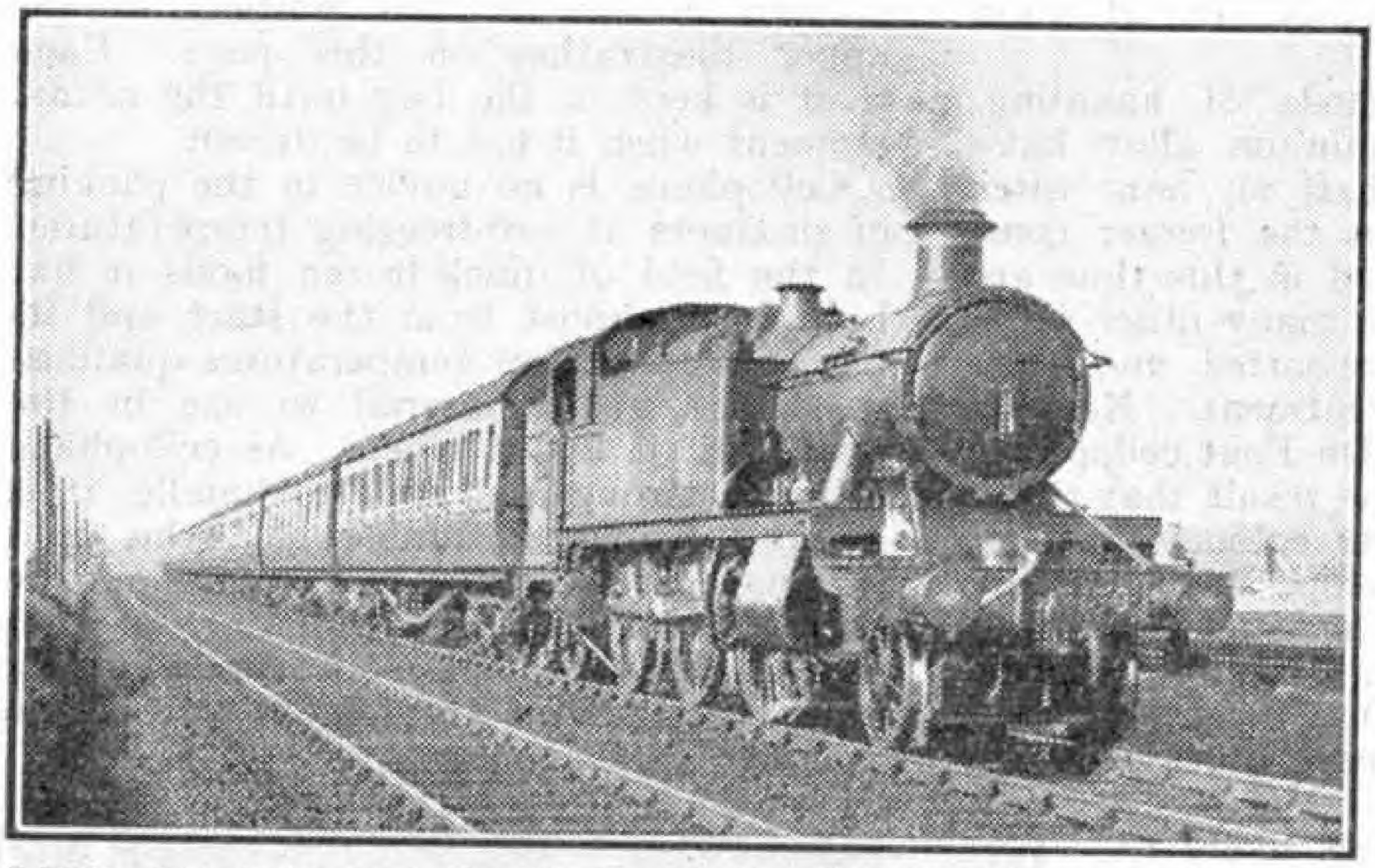
Great Western Tidings

New 2-cylinder 4-6-0s of the "1000" class are in service up to No. 1009; those numbered from 1001 onward have a single blast pipe with ordinary chimney. They are working on various main line routes from Old Oak Common, Bristol and Newton Abbot sheds.

More 0-6-0 pannier tanks recently completed are numbered 9619-32. These ubiquitous "panniers" now appear to be the most numerous locomotive type in Britain, as there are more of them than of the L.M.S. class "4" 0-6-0s, hitherto the largest class and numbering 772 engines, but the "panniers" are spread over many series, some dating back a good many years.

Scrapping on a much larger scale than for a number of years is announced from Swindon. Among the 52 locomotives withdrawn in November and December last was 0-6-0 No. 900, one of the oldest engines in the country. This was built by Messrs. Sharp, Stewart and Co., Glasgow, as long ago as 1864, for a small line soon afterwards absorbed into the former Cambrian Railway as their No. 45, and for a time was named "*Rhiewport*." Others being scrapped are 18 of the 27xx "panniers" introduced in 1896, as well as a number of the old "1501," and "1901" classes of similar engines; five more of the sturdy "2301" Dean 0-6-0s; several tanks inherited from the pre-1923 separate Welsh lines; 0-4-2Ts numbered 3573 and 3580; and, last but not least, "Saint" 4-6-0 No. 2921 "*Saint Dunstan*," recently of Banbury shed.

Mineral engines fitted for oil burning include 2-8-0s Nos. 2854, 2872, 2888 and 3865.



G.W.R. fast train from Reading to London (Paddington) passing Iver. The locomotive is 2-6-2T No. 6160. Photograph by C. R. L. Coles.

Some "Piebald" Expresses!

It is well known that rolling stock has been pooled to a great extent during the period of hostilities on account of the vast numbers of special trains and coaches run from one company's system to another on Government account. As a result whole trains belonging to another line were often used in ordinary service, while on other occasions extraordinarily "piebald" or cosmopolitan main line trains have been observed. For instance, an express to Paddington from Cheltenham last summer was composed of old G.W.R. clerestory-roofed and modern corridor stock, some painted wartime brown and others chocolate and cream, five L.N.E.R. cars finished in varnished teak, a Southern coach in malachite green and, at the end, a third brake of the L.M.S. painted Midland red!

Another through eleven-coach train on the G.W.R. in the West of England, hauled by a "Hall," included two L.M.S., four Southern, four L.N.E.R. and one G.W.R. vehicles, all assorted indiscriminately in the make-up!

Southern Locomotive News

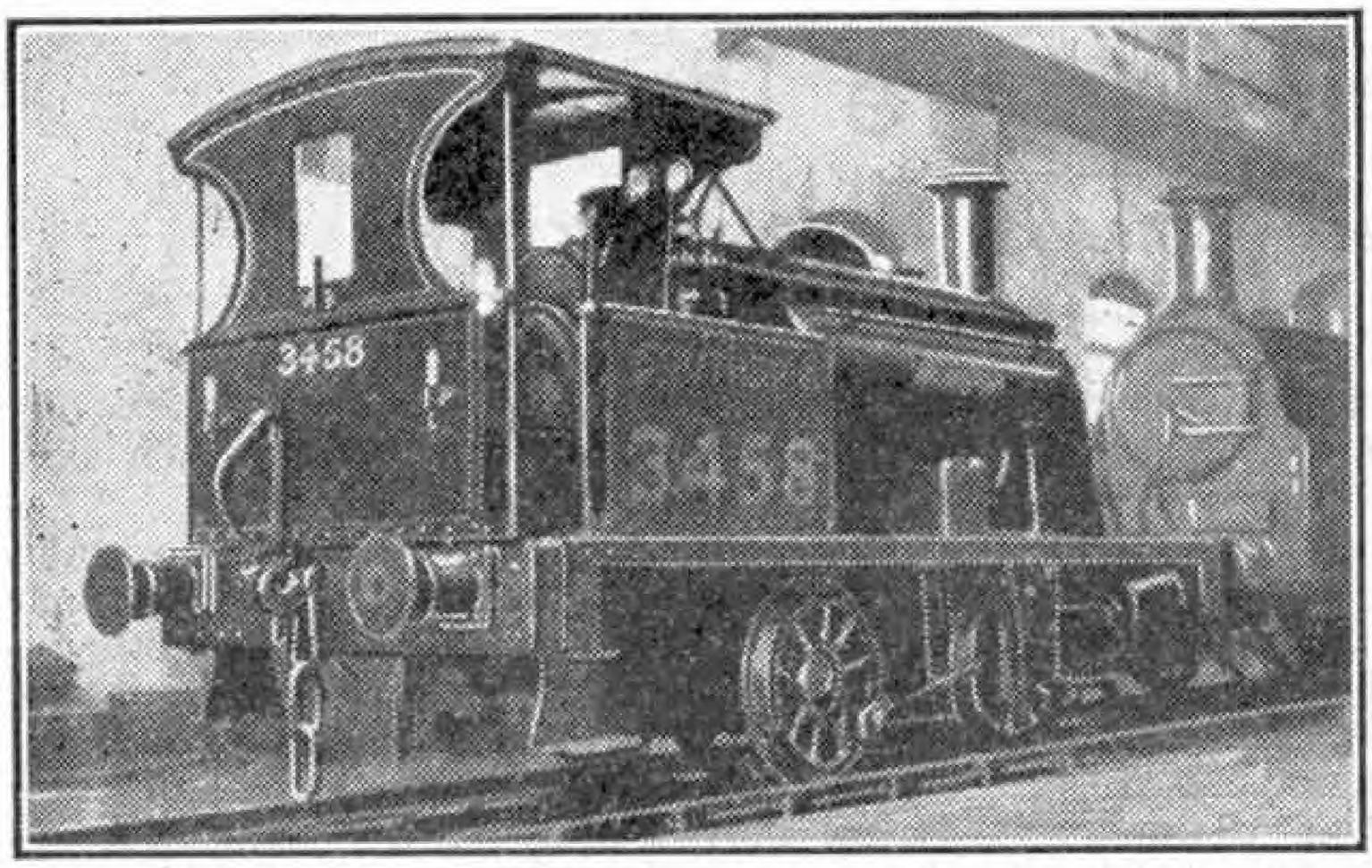
Further progress in the construction of bright green "West Country" 4-6-2 locomotives is indicated by a reader's report of seeing No. 21C 120 at Redhill on 17th Jan. last. It had worked the customary parcels train from Brighton as a "running-in" turn. Engines of this new "Light Pacific" type are now being more used on general service, such as between Brighton and Southampton or Salisbury, and between Salisbury and Exeter on the main line.

Two interesting veterans have been withdrawn after long service. Mr. Adams' final express designs for the London and South Western Railway consisted of several series of outside-cylindered 4-4-0s that were sound performers of neat appearance. Nos. 557-76 and 657-666, built between 1892 and 1896, with 6 ft. 7 in. driving wheels, became known as the "T3" class, of which the sole survivor in traffic, No. 563, has made her last run on the Salisbury line local goods from Basingstoke, where she had latterly been stationed. Though superseded many years ago on regular express duties by more modern and powerful 4-4-0 or 4-6-0 types, these stout little engines were still called upon at times to haul light specials, and to replace or assist the large newer locomotives when in trouble owing to some unforeseen defect. No. 563 worked an Ocean Liner express of five coaches from Southampton into Waterloo as late as 1933, possibly as a substitute.

When the Southampton Dock undertaking was purchased from a private company in 1895, the plant included some small tank engines. One of these was "*Clausentum*," named after the Roman settlement that once thrived on the site of part of what is now Southampton. This engine was formerly London and South Western No. 457, and then was numbered 0457, to indicate a duplicate number. It became No. 734 in 1913 and was long familiar round about Eastleigh. Now it has gone, the only remaining example of the "0458" class is No. 3458 "*Ironside*" which is still the locomotive shed shunter at Guildford. The engines of this class were quaint little 0-4-0 outside-cylindered saddle tanks with 3 ft. 2 in. driving wheels and boiler pressure of only 120 lb. per sq. in., constructed in 1890 by Messrs. Hawthorn, Leslie and Co. Ltd.

Southampton Docks' Fine Achievement

At the extensive Southampton Docks, owned and managed by the Southern Railway, records of a remarkable nature were set up during 1944 in connection with the Allied invasion of the Continent, even for that Mecca of huge ships and customarily enormous handlings of passenger and freight traffic. Nearly 23 million tons of shipping entered the port; 2 million tons of freight were dealt with over the



S.R. No. 3458 "Ironside," the last saddle tank engine of the former Southampton Dock Co. Photograph by J. Sturt.

quays, in addition to 1¾ million men, including a large proportion of American Forces. About 21,000 railway wagons and other vehicles as well as 770 locomotives were shipped after "D Day," necessitating streams of special trains of every kind from all parts of the country. The operation of these required constant organisation and revision in connection with ordinary and other special traffic, night and day.

Special Trains for Art Treasures

Among the innumerable special tasks the British Railways have handled in war conditions have been the packing, conveyance and cartage of many tons of art treasures, pictures or priceless books removed for safety reasons from London to large houses, caves and other often remote temporary resting places. In some cases special trains of containers and vans were needed at a time of great pressure with Service and evacuation traffic, but the Curators' requirements were met and now for the most part the return journeys have been effected.

The L.N.E.R. "Director" Classes

The "Director" class engines, so called because the first ones were named after Directors of the former Great Central Railway, were designed by the late Mr. J. G. Robinson for the express services between Marylebone and Manchester, and at one time were among the largest and most notable 4–4–0 types in this country. They were handsome and powerful inside-cylindered locomotives with a reputation for steady riding, economy and high speed.

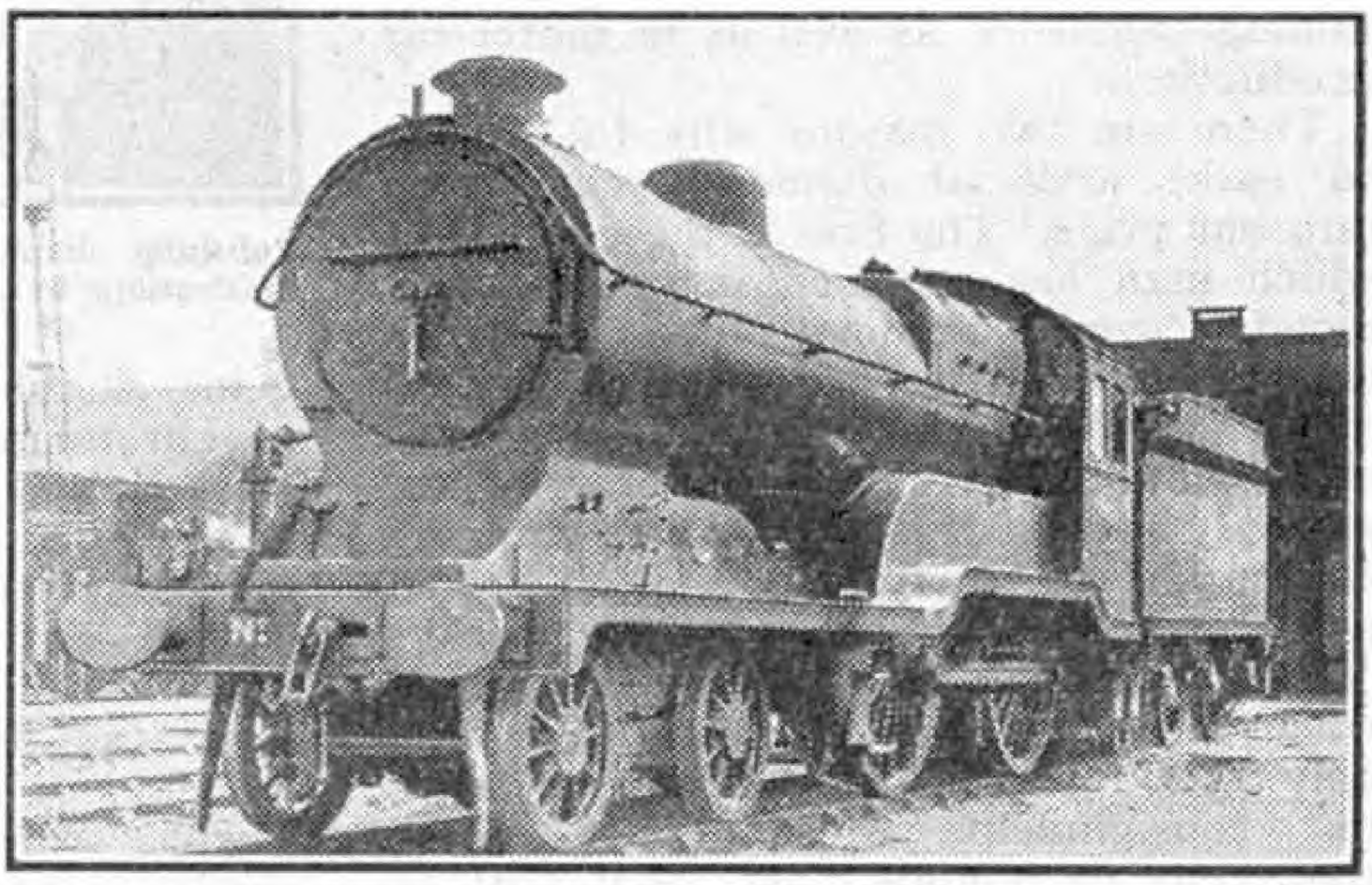
With the light loads then usual these engines did excellent work for many years on the very tightly timed services south of Nottingham, in addition to tackling the long, heavy gradients through Sheffield to Manchester. The first series are now class "D10," and the newer batches class "D11." Several of the latter shared with the famous Ivatt Great Northern "Atlantics" the working of the "*Queen of Scots*" Pullman express non-stop between Harrogate or Leeds and King's Cross round about 15 years ago, being probably the only 4–4–0 engines in the world at that late date making daily non-stop runs winter and summer of nearly 200 miles at an average of 54 m.p.h. Twenty-four modified "D11s" were built for the L.N.E.R. during 1924–5.

Not long before the outbreak of war in 1939, No. 5434 "*The Earl of Kerry*," one of the "D10" class, dating from 1913 and some distance from her original native haunts, was rather unusually working one of the principal Doncaster-Leeds G.N. section expresses from King's Cross, which had been hauled by a "Pacific," with a greater load, as far as Doncaster. With nearly 300 tons No. 5434 averaged 61·4 m.p.h. over the 14¼ miles between Carcroft and Sandal, including ascents at 1 in 150–200, and a maximum of over 70 was touched on the descent before Wakefield, which was reached in the excellent time of 22¼ min. for 20 miles. After the Bradford portion had been detached, lessening the load by 90 tons, a vigorous tackling of the 1 in 100–122 climb past Wrenthorpe and Lofthouse was followed by a smart though careful descent from Ardsley amid much industrial and interesting locomotive activity, bringing the train into Leeds (Central) in 14½ min. from Wakefield, 10 miles away. Over these two short stages 7¼ min. had been gained by dint of an effort that would certainly not have disgraced a "Pacific" or "Green Arrow."

"Directors" have been regularly hauling the reinstated Sheffield-Marylebone restaurant car expresses, up to London in the morning and back in the evening, since October last, and they have kept good time, though the schedules are liberal at present until conditions become more normal.

Restaurant Car Developments

A welcome indication of a further move towards improved travelling facilities was the restoration of a number of dining, restaurant and buffet car services as from January last. On account of staff and supply shortage, as well as the heavy loading of passenger trains, restaurant cars have been scarce or entirely absent during the past three years, but plans are now afoot to operate many newly decorated or freshly equipped cars on various routes as soon as circumstances permit.



L.N.E.R. "Director" class 4-4-0 No. 5501 "Mons," which has performed well on Marylebone-Manchester and King's Cross-Leeds expresses.

Diamonds are Trumps

Can These Gems Be Made Artificially?

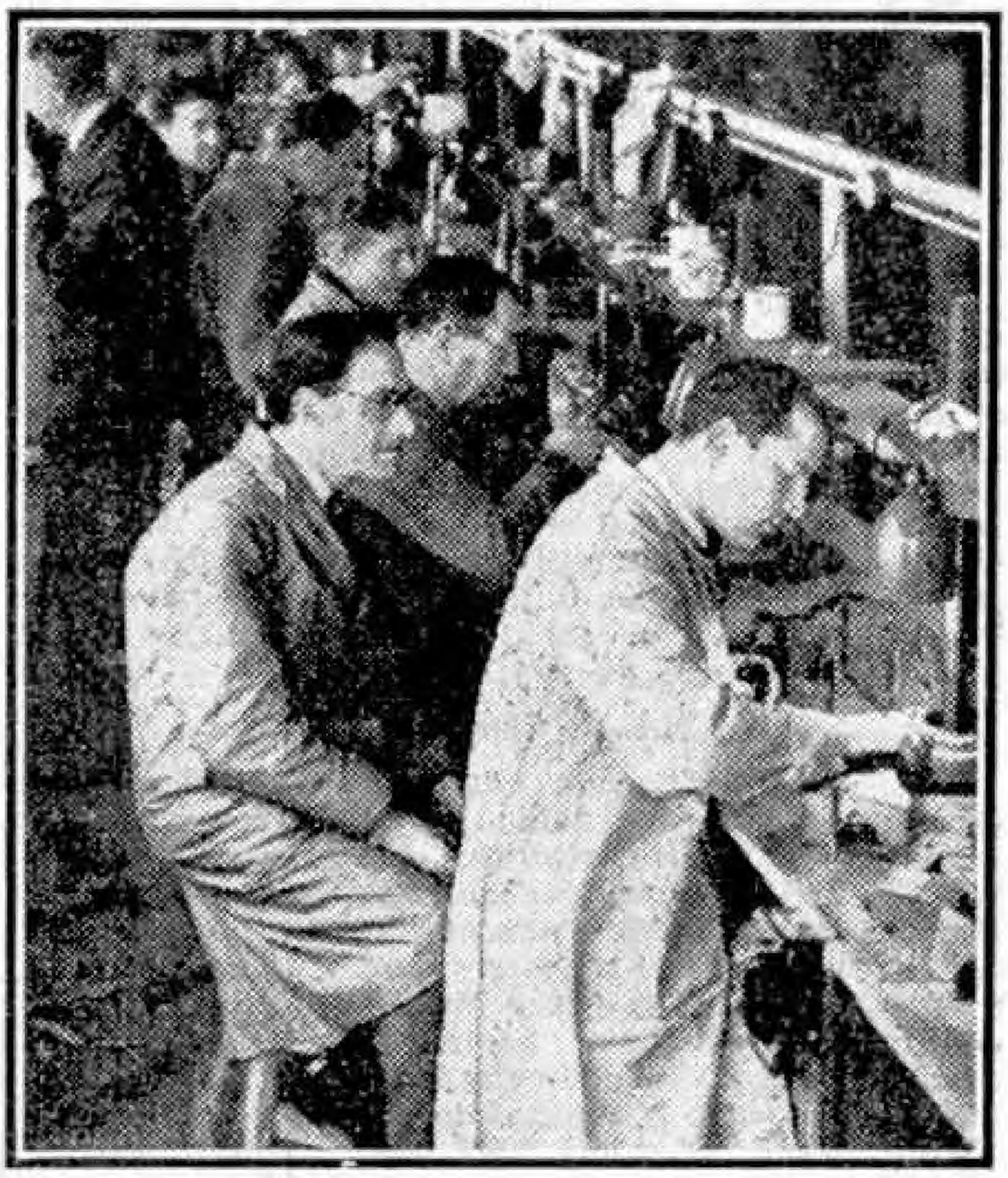
By M. Schofield

THE finding in Sierra Leone of the largest gem diamond in the world, a 770-carat diamond as big as an egg, brings to mind how of all things on Earth the diamond never loses in value. Here is a form of carbon, chemically worth no more than so much soot or charcoal, yet because of its physical values, its hardness and brilliance it is unsurpassed. Nature has created the crystal-clear diamonds used for jewellery, but she has also provided many inferior stones, often black, and these "ugly ducklings" are of supreme value to industry for drilling and cutting hard alloys and engineering steels.

It is tantalising to the expert chemist, who has accomplished so much in making dyes and drugs, artificial silk and nylon, to be beaten in the challege that Nature has set us, to make artificial diamonds from ordinary carbon. The quest is important, not so much in order to make gems, but to get more diamonds for tipping drills, for the indestructible teeth of special saws, for "trueing" grinding wheels, and for making hard dies with fine holes through which are drawn all those filaments used in electric lamps and wireless valves. Every lorry, machine gun, aeroplane or submarine has been made by the use of diamond-tipped drills at some stage in its manufacture, and diamonds have proved essential in drills used by the dentist, by geologists and mining engineers, as well as in motor-car production.

There are two reasons why the failure to make artificial diamonds cuts deep into our pride. The first is the great skill which man has acquired in cutting diamonds, using diamond dust on tiny cutting wheels, since only "diamond cuts diamond," as the saying goes. Antwerp will no doubt recover its former prominence, not only as a great port for Allied shipping continuing to carry food for liberated peoples, but as the home of the world's diamond-cutters. Of 23,000 cutters there when the Germans first invaded Belgium, only 4,000 remained when liberation came, but consignments of diamonds worth thousands of pounds have been sent to open up the trade and to find work for the skilled men now free. London too has her diamond-cutters, refugees driven out by the Nazi terror who brought their skill and knowledge to this country.

The second reason why failure to make diamonds is so tantalising is that so much success has been achieved in manufacturing other artificial gems, for use as ornaments and also in "jewel" movements of watches and aeroplane and electrical instruments. These movements hardly wear out as the years go by. For making such rubies and sapphires, which have exactly the same chemical composition as the natural



Polishing diamonds in a London workshop. The illustrations to this article are reproduced by courtesy of J. C. Ginder Ltd., London.

gems, aluminium oxide is melted. Oxides of chromium or other metals imparting the required tint are added when jewellery is the aim, and a molten glassy "boule" or mass is obtained. Melting has to be carried out in tall narrow furnaces in which an oxy-hydrogen flame burns to give the intense heat necessary. At Annecy, in France, and in various Swiss towns, where water power furnishes electrical energy for decomposing water to give the necessary hydrogen and oxygen, the manufacture goes on in long furnace

rooms where men with blue glasses watch the formation of the glassy boule, which is cut to the required shape when cold.

But the diamond, no! Nothing will induce carbon to melt and nothing will dissolve carbon except molten metals. And even when carbon crystallises from molten metal under great pressure, just as diamond probably was created in the one-time molten earth, the best product obtained consists of a few worthless fragments.

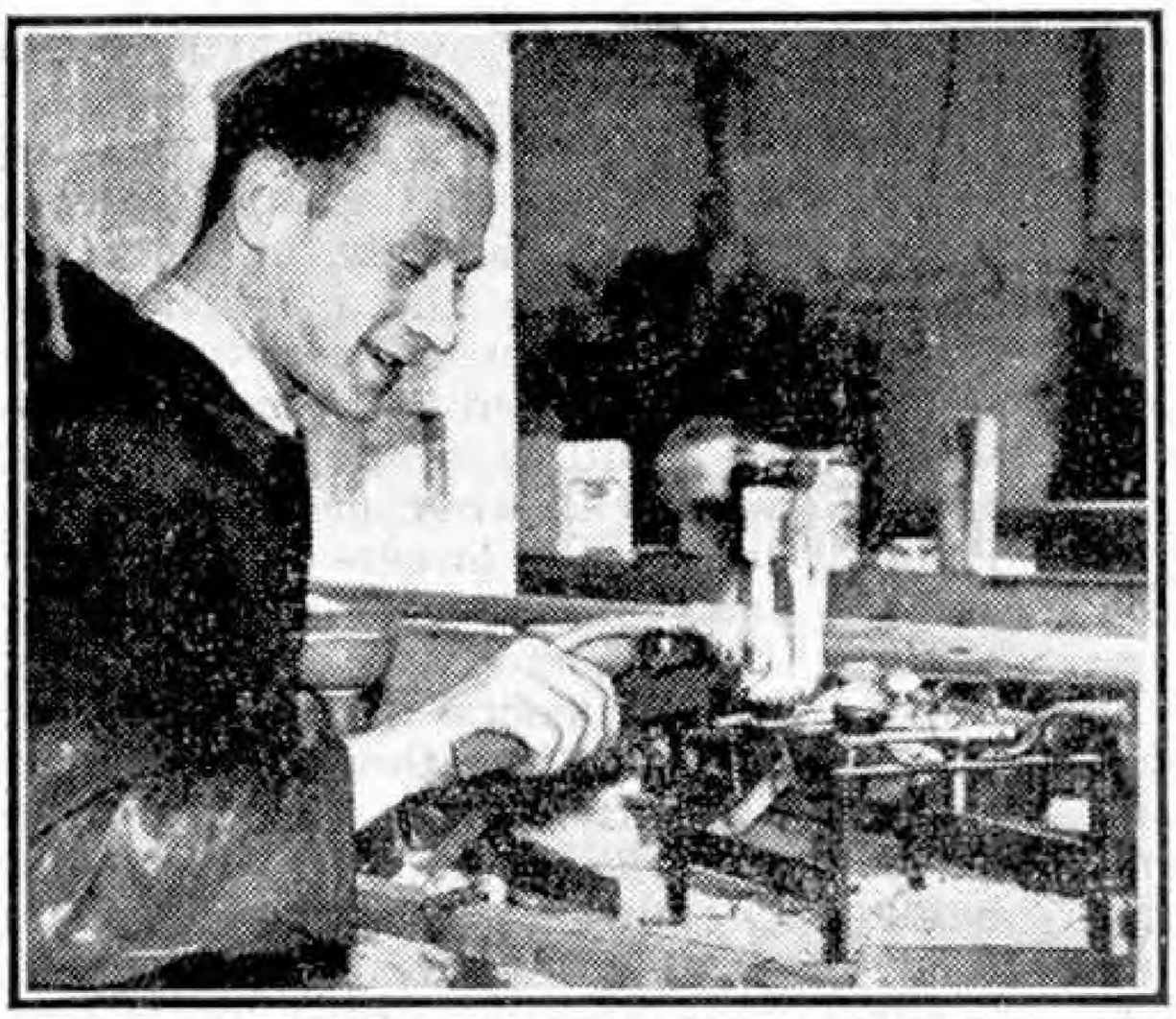
Many quacks, charlatans and others have been fascinated by the problems of diamond-making. Of really scientific efforts to make the gems, those by two chemists and an engineer deserve special mention, and one of these experimenters actually produced tiny diamonds, which however were too small for use. Henri Moissan, the brilliant Frenchman who invented the electric furnace, made many attempts. With his faithful assistant Philip Lebau he dissolved carbon in molten iron in some experiments, and in molten silver in others, heating the metals in large crucibles in his electric furnace. Seizing in tongs the white-hot vessel he plunged the crucible in cold water, risking the danger of violent explosions caused by the disruptive effect. When cold the mass of iron was dissolved away in acid to leave a few fragments of carbon. Were they diamonds, however? Moissan's specimens have been lost, so that the X-ray test cannot be applied to them, but if they were diamonds, they were small and black.

Sawing a diamond with a tiny saw, using diamond dust.

Next came that eminent engineer Sir Charles Parsons, inventor of the steam turbine bearing his name. Sawing off part of the barrel of a duck gun, he first used this to fire high-speed bullets into cavities to get the necessary pressure for diamond formation. Next he tried a 200-ton hydraulic press combined with strong electric heating, but without avail. Diamond-making is certainly a problem for the engineer, yet all that Parsons obtained from a long series of dangerous experiments were a few fragments of crystal which failed to answer the first test for diamond—to burn away completely in oxygen.

Most striking of all would-be diamond-makers was James Hannay, a Glasgow chemist, who, though he suffered from ill health, hardly improved by the nervous strain of watching his furnace and dodging the explosions, did obtain diamond fragments. Hannay had no college training, but was attracted to chemistry as a boy. He got a job in a laboratory and rose to become works manager, but poor health caused him to resign this post and take a poorly-paid job in a college laboratory. Yet his lack of health did not stop his spectacular attempts at diamond-making.

Hannay used steel tubes shaped like a gun barrel, closing them with blacksmith's welds after putting in them mixtures of paraffin and bone oil together with lithium, a metal that is like sodium and combines with the hydrogen (*Continued on page 128*)



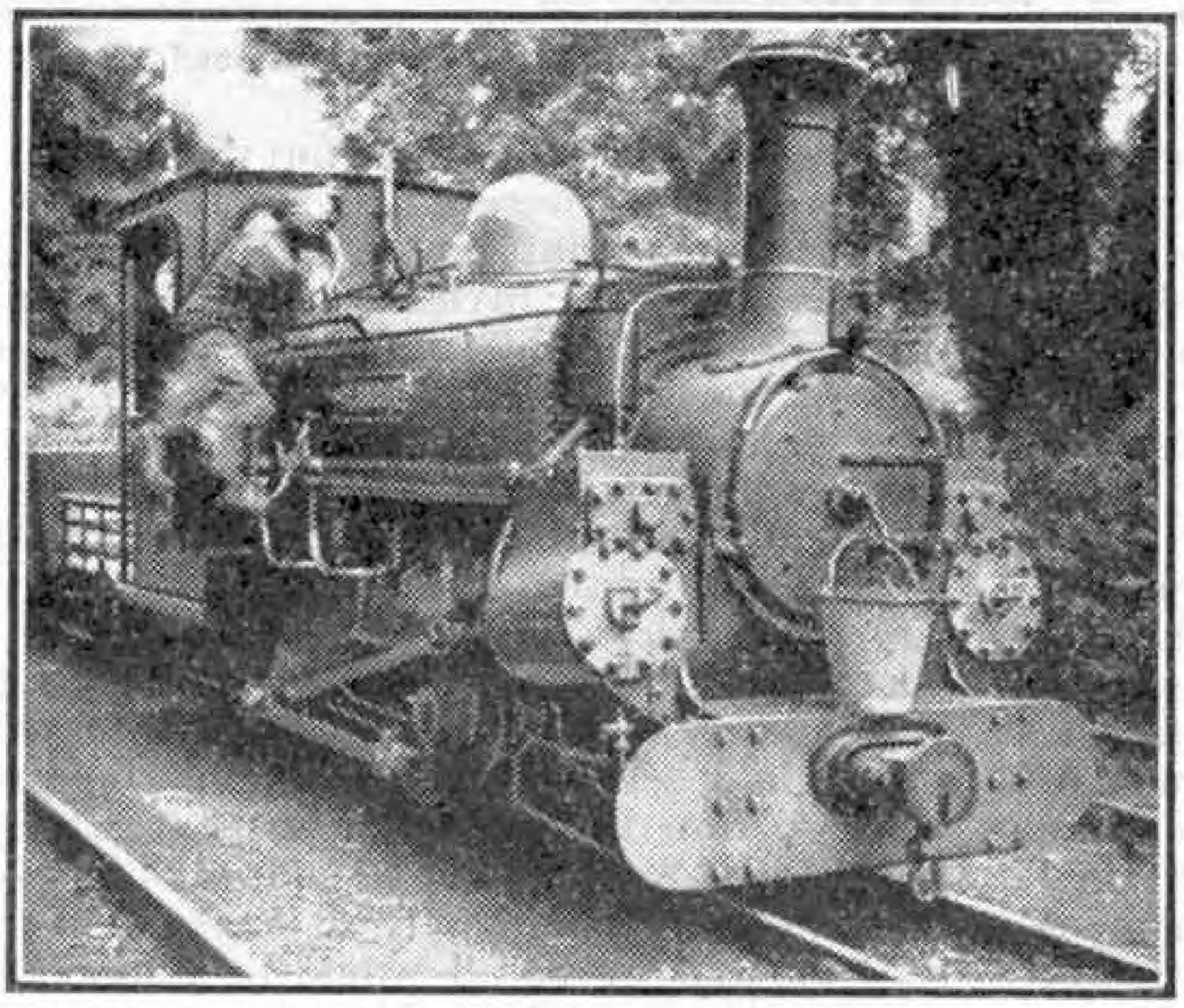
Examining the cut of a diamond during the polishing process.

The Penrhyn Railway

A North Wales Narrow Gauge Line

By S. Roberts

THE Penrhyn Railway is a very interesting narrow gauge mineral railway in North Wales, conveying slate from the Penrhyn Quarry at Bethesda down to the Menai Strait at Port Penrhyn. It was first laid down as a horse tram road, and opened in 1801. Originally it had oval section rail, with the longer diameter vertical, supported in cast-iron "egg-cup" chairs on stone blocks. The only traces of the old tramway now remaining are a masonry bridge and a viaduct, both spanning the river Cegin at the lower end of the line; these can be seen, overgrown with trees and bushes, alongside the modern steel structures that have replaced them. To-day, the line follows a different course over most of its length, and is laid in substantially the same fashion as the better known Festiniog Railway, perhaps even a shade heavier. The rail used is 50 lb. bullhead, laid in big cast chairs. The track is excellently maintained; even during the War it was kept pretty well free from weeds, and new sleepers and ballast appear promptly at weak spots.



"Blanche," one of three tank locomotives built in 1882 by the Hunslet Engine Co. for use on the Penrhyn Railway, and named after members of the Pennant Family.

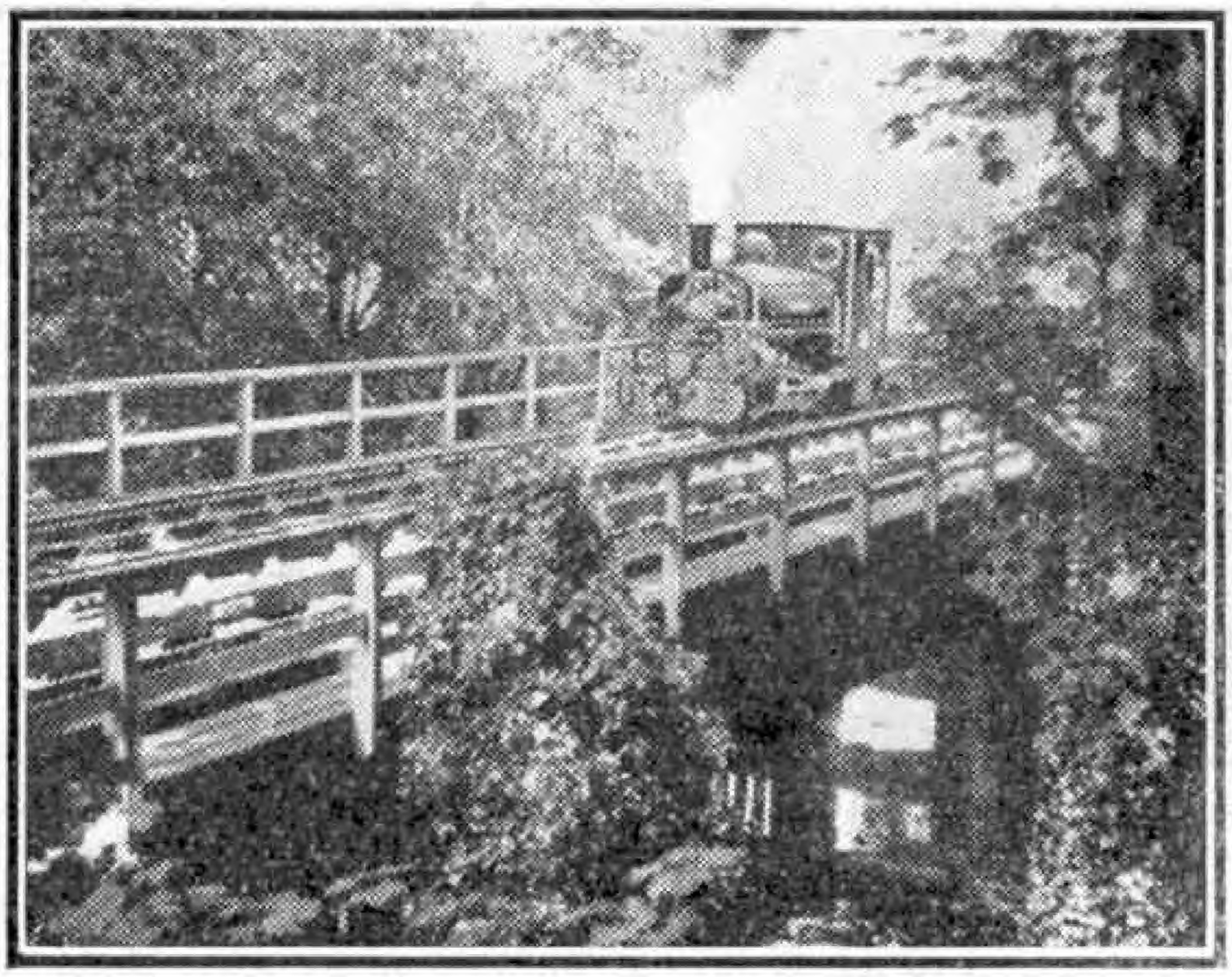
The lower terminus of the railway, Port Penrhyn, is on the north side of the mouth of the Cegin, and the first two miles or so of the line run along the bank of the river, crossing a loop of the Cegin just above the port by a three span steel viaduct and bridge. Swinging away from the Cegin, the heavy climbing begins. Up to Felin-Hen station the gradient is fairly heavy, but it stiffens as the line swings east and the climb up the side of the watershed, through Tregarth, into the Ogwen valley begins. After a mile or so the railway turns south again, rambling into Bethesda and on to the quarry on a ledge cut high up on the side of the Ogwen valley.

At present the line is not as busy as in pre-war days, since the quarry it serves is short of men. There are two loaded trains down, two trains of empty wagons up, and a workman's train each way daily. One locomotive in steam can thus deal comfortably with a day's working, including shunting in the yard at Bethesda. A separate locomotive is kept for shunting at the port.

Steam was first introduced about 1876, and the earliest locomotives were built by De Winton and Co., Caernarvon. In 1882 the Hunslet Engine Co. delivered a powerful little engine in use to-day. The design evidently proved successful, for two more were supplied from the same drawings some years later, the only modifications introduced being in the cylinder lubricators and sandboxes. The first of these engines was christened *"Charles,"* and the second and third were named *"Linda"* and *"Blanche,"* all after members of the Pennant family, the owners of the quarry and the line.

These three locomotives are four-coupled tanks. The cylinders of *"Charles"* are 10 in. by 12 in., but those of the other two are slightly larger. Each weighs 12 tons 5 cwts. They are capable of hauling 60 empty wagons over the maximum gradient of 1 in 45 or so.

From time to time other locomotives have been obtained by second-hand



"Blanche" crossing Cegin Viaduct. The viaduct has three steel spans.

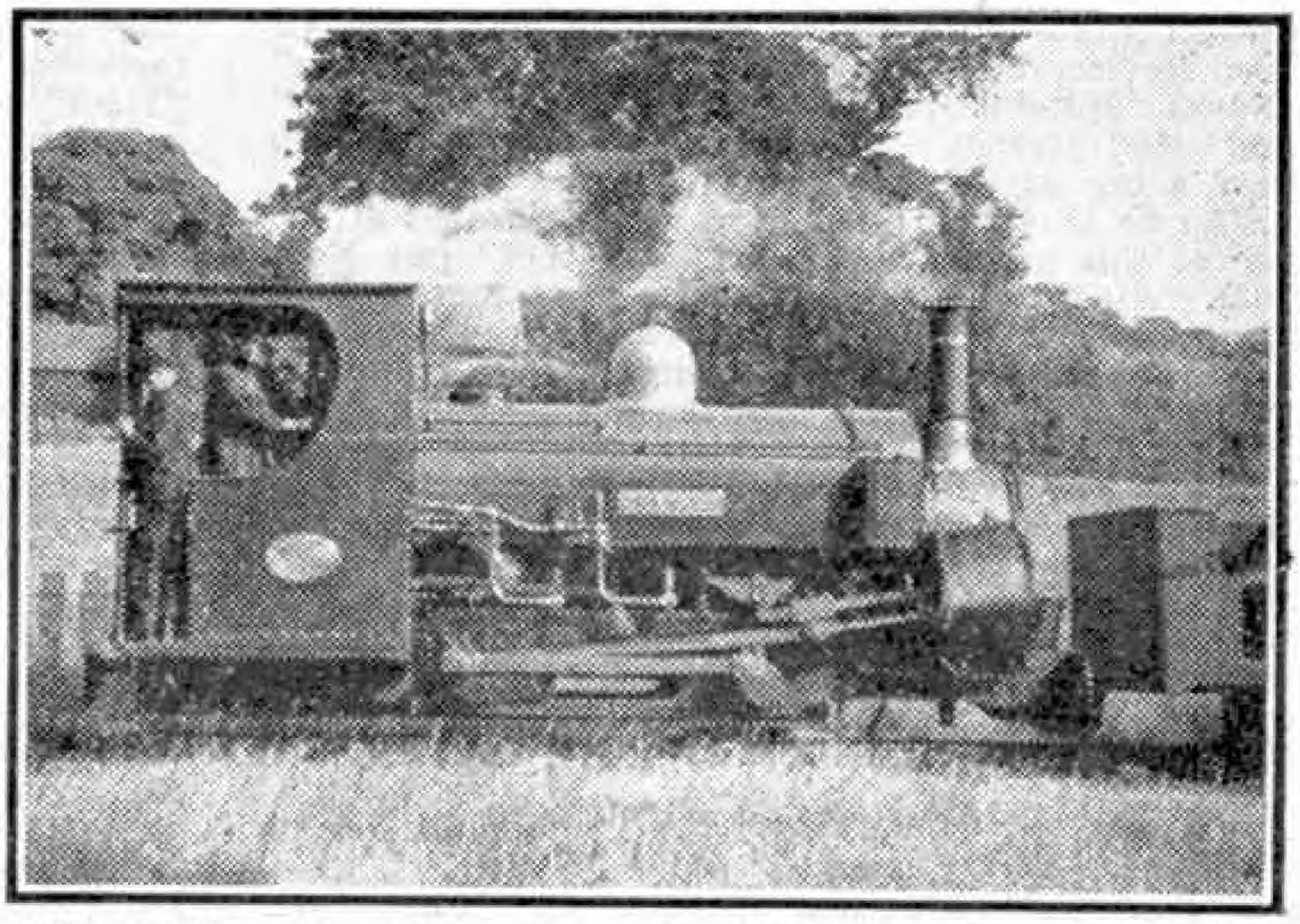
purchase. Among these were three ex-R.O.D. tank engines of the "Prairie" or 2–6–2 type, built by the Baldwin Locomotive Works of Philadelphia in 1917–1918. These engines seem to have had only moderate success. They were very powerful, but they were heavy on coal, water and oil. The three were named *"Tregarth," "Felin-Hen"* and *"Llandegai,"* after villages along the line. They suffered sad fates. *"Llandegai,"* without wheels and motion, rusted for years behind the engine shed at Port Penrhyn. *"Tregarth"* was towed down from Bethesda early in 1940 and scrapped; it had then spent 18 years in the open, and a small tree had grown between two of the coupled axles. *"Felin-Hen,"* the only one of the trio maintained in good condition, was sold for use in Australia.

Suppose now we board a train at Port Penrhyn at the start of a typical run. On leaving the port the line first crosses the loop of the Cegin, and then plods up the river bank, running through a densely-wooded glade, with the river only a few feet away. It runs under the mighty arches of the viaduct carrying the L.M.S. Chester-Holyhead line across the valley, and gradually we wander away from the river, up to Felin-Hen. There we rumble over a girder bridge spanning a road, pass the little slate shed marking the station, and then, with the gradient stiffening and the engine beginning to labour, dive into an extremely wet and narrow cutting. Emerging at last at the top we run through broken country to Tregarth, where we negotiate the passing loop and trundle round a sharp right-hand curve on to the rocky ledge high above the Ogwen.

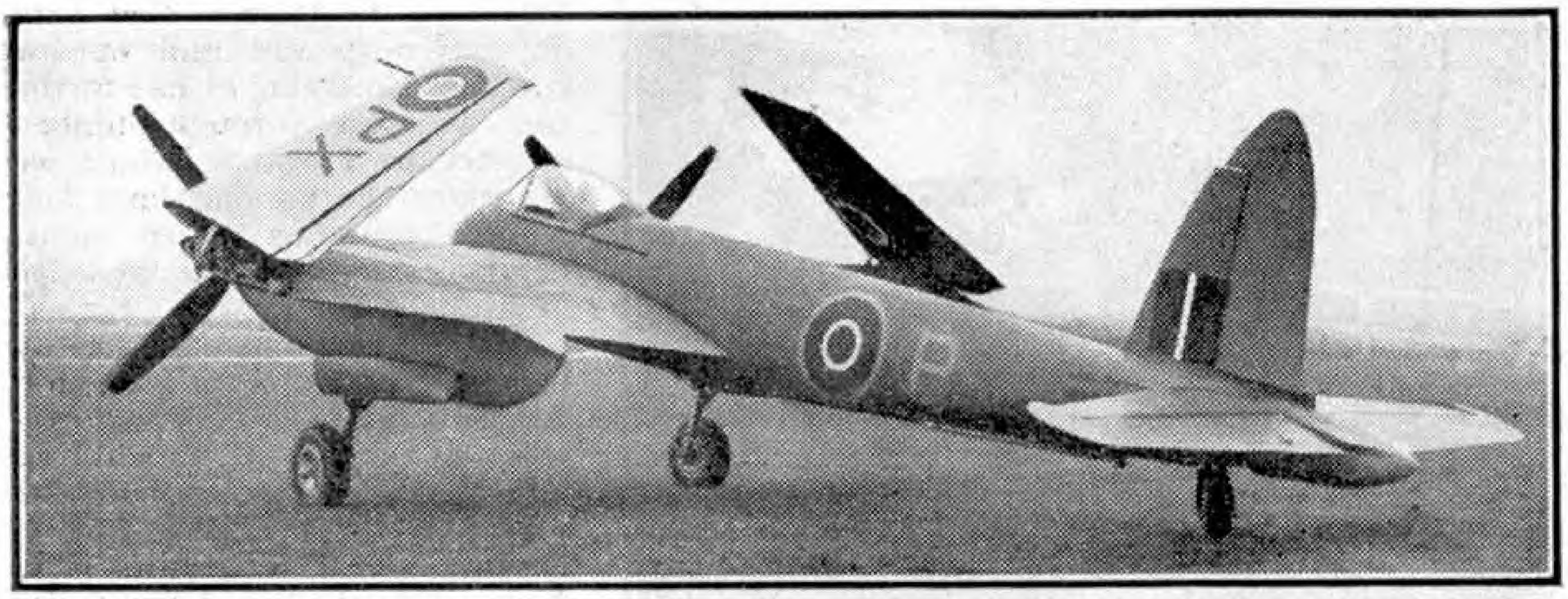
The scenery here is really beyond description for grandeur. At one point, in succession downward on the face of the cliff, we have first the ledge carrying the narrow-gauge line. Below it on another ledge, and parallel to it, is a side road; and lower still the Bangor-Bethesda branch of the L.M.S. crosses the river and plunges into a tunnel below us. Finally, at the bottom is the river, tumbling over a very stony bed.

Shortly afterwards, with much whistling we cross a road fork by a rather complex level crossing, and run into a cutting formed in the heart of a great mound of waste slate. This cutting is neatly edged with sawn slabs. Then we reach our journey's end, that part of the quarry known as the Mill. Here are some slate sawing and splitting sheds and the Penrhyn workshops. The power needed for both of these is derived from two large waterwheels driven by waste water from the quarry above. The offices and sorting sidings also are here.

Over almost the whole road the engines are driven in full foregear at about three-quarters full regulator; yet they never show any sign of steam shortage.



"Charles," another of the three Hunslet Engine Co. tank engines. The third was named "Linda."



The de Havilland "Sea Hornet," with wings folded. Photograph by courtesy of de Havilland Aircraft Co. Ltd.

Air News

The D.H. "Sea Hornet"

Until a few years ago it was considered inevitable that fleet fighter aircraft must have an inferior performance to their shore-based counterparts. It was logical, for the Navy believed that a pilot had enough to do flying the machine and fighting without the additional burden of navigation. So an observer was carried. Then, to assist in navigation, identification and, later, detection of the enemy, all sorts of radio and other equipment had to be fitted. The wings had to fold and a deck-landing arrester hook was needed, all of which added weight and increased the size of the fighter, with a consequent adverse effect on performance.

Those theories were shattered in 1941 when, to counter German long-range bombers far out over the Atlantic, the "Sea Hurricanes" and "Seafires" went into service with the Fleet Air Arm. They were more or less standard "Hurricanes" and "Spitfires" fitted with an arrester hook—in fact none of these early machines had folding wings. But they proved once and for all that Naval fighters could be single-seaters and really did not need to be crammed full of radio sets. Since then almost every new fighter designed in this country has been developed for both Royal Air Force and Fleet Air Arm service. So we have the "Sea Fury," "Seafang" (Naval "Spiteful"), "Sea Vampire," "Sea Mosquito," and "Sea Hornet"—all of which were intended to play a big part in the final assault on Japan.

The de Havilland "Sea Hornet," illustrated at the top of this page, is basically a "Hornet" (see Nov. 1945 "*Air News*") fitted with folding wings and an arrester hook. Its top speed of about 460 m.p.h. makes it the fastest propeller-driven fleet fighter in the world, second only to the jet-propelled "Sea Vampire," also built by de Havillands. The wings fold upwards hydraulically from a point outboard of the air intakes for the two "Merlin" engines, and the arrester hook is carried under the fuselage forward of the tail wheel. The "Sea Hornet" had its deck-landing trials aboard the 14,000-ton light carrier "*Ocean*" several months ago and proved very promising, with good handling qualities both in the air and on deck. J.W.R.T.

More Record Flights

The R.A.F. "Lancaster" aircraft "*Aries*" that last year made a notable flight to the North Pole has this year made a record flight to South Africa. The machine took off from Thorney Island, near Portsmouth, on 16th January last and flew to Brooklyn aerodrome, Capetown, 6,900 miles, in 32 hrs. 21 min., a substantial reduction on the record time of 39 hrs. 25 min. set up by Alex. Henshaw in February 1939 on a London-Capetown flight in a Percival "Mew Gull" light monoplane. On the way "*Aries*" was refuelled at Cairo, where a 40-min. stop was made.

In the United States a Lockheed P-80 "Shooting Star" jet-propelled fighter recently flew from Long Beach, California, to La Guardia airport, New York, 2,470 miles, in 4 hrs. 13 min. 26 sec., averaging 584.82 m.p.h. This was almost 1¼ hrs. faster than the previous transcontinental record. The machine had long-range fuel tanks.

More British Air Liners for Post-War Services

Some details of British transport aircraft now in service and of new machines on order for British air lines have been given in the House of Commons. The types of aircraft concerned include transport conversions of military machines, civil types developed from military machines, and new types designed specially for commercial services.

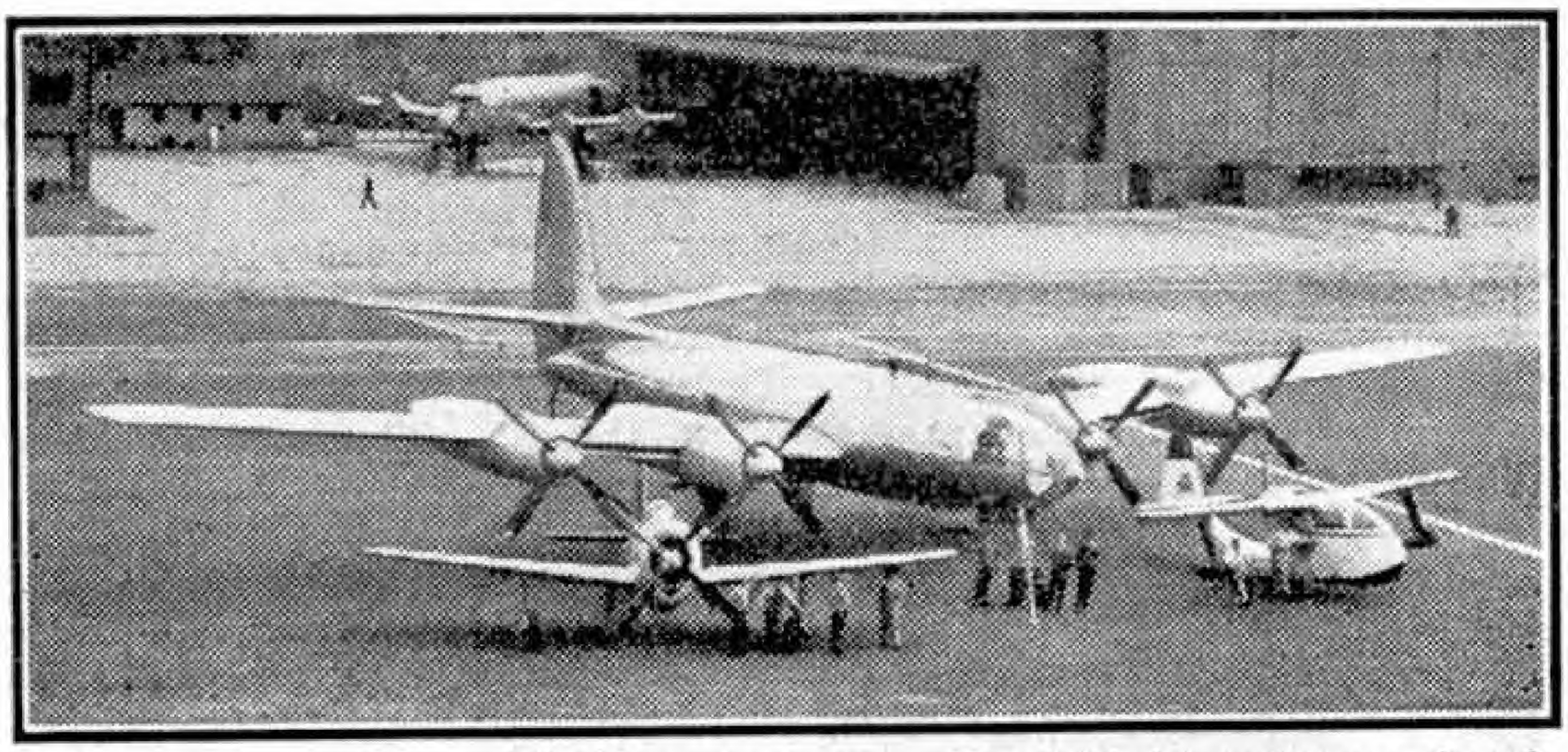
The conversion types mentioned included the Avro "Lancastrian," of which there are 27 in service and 12 more on order. The Mk I "Lancastrians," which have sleeping accommodation for six passengers, are used on British Overseas Airways' "Kangaroo" service to Australia and New Zealand, and the Mk III version, with seating for 13 day passengers, is used by British South American Airways on the South American air route. There are 12 Handley Page "Halifax" C. Mk VIIIs on order, and probably these big machines will be employed on the B.O.A. "Tiger" service to India and West Africa. Another conversion type is the Short "Sunderland" III flying boat, of which 24 are in use and 12 more are expected to be ready by next Autumn. In the meantime the 13 Short "C" class and one "G" class flying boats continue to give good service.

Civil types developed from military aircraft include the Avro "York," and so far 25 of these machines have been delivered, and there are 12 more to come. The "Yorks" are allocated to B.O.A.'s "Springbok" service to South Africa and to the "Tiger" service already mentioned. It is expected that 20 Avro "Tudor" I air liners on order will be ready by next October, and they will be used on the North Atlantic air route. The "Tudor" I seats 12 passengers. The large total of 79 "Tudor" IIs have been ordered, and delivery is expected to begin in May this year. One version of this new "Tudor" will seat 36 to 44 day passengers, and another will have sleeping accommodation for 22 persons. In addition 108 Vickers "Viking" transports are on order, and they will be used on European services and on the main British internal air routes. A new flying boat on order is the "Solent," a civil version of the Short S.45 "Seaford."

New types ordered include the D.H. "Dove" air liner.

4,640-Mile Delivery Flight

Mr. Jim Mollison, the noted airman, recently delivered a Percival "Proctor" V light aeroplane by air to the purchaser in Brazil. This long delivery flight of 4,640 miles began from St. Mawgan, Cornwall, and the first stage took Mollison as far as Rabat, in Morocco, 1,100 miles, which was flown in 10 hrs. After a short stop he flew on to St. Etienne, in French Mauretania, reached in 8½ hrs., and from there made a 4½ hrs. flight to Bathurst, where his machine was overhauled before he made the long transatlantic flight of 1,940 miles to Recife airport, Pernambuco, which took 15 hrs.



A Republic trio. The new XF-12 4-engined long-range photo-reconnaissance aircraft. The smaller machines in front are (left) a "Thunderbolt" fighter and (right) the "Seabee" 4-seater amphibian, a new civil machine. Photograph by courtesy of The Republic Aviation Corporation, U.S.A.

Four-Engined Photo-Reconnaissance Aircraft

The Republic Aviation Corporation, U.S.A., have developed for the U.S. Air Technical Service Command a new high-speed long range photo-reconnaissance aircraft known as the XF-12, which is shown in the upper photograph on this page. It is virtually a flying photographic laboratory, with three camera stations, dark room equipment for storing and loading film, flash bombs for night photography, and comprehensive radio and radar equipment; also it has armour plate for protection.

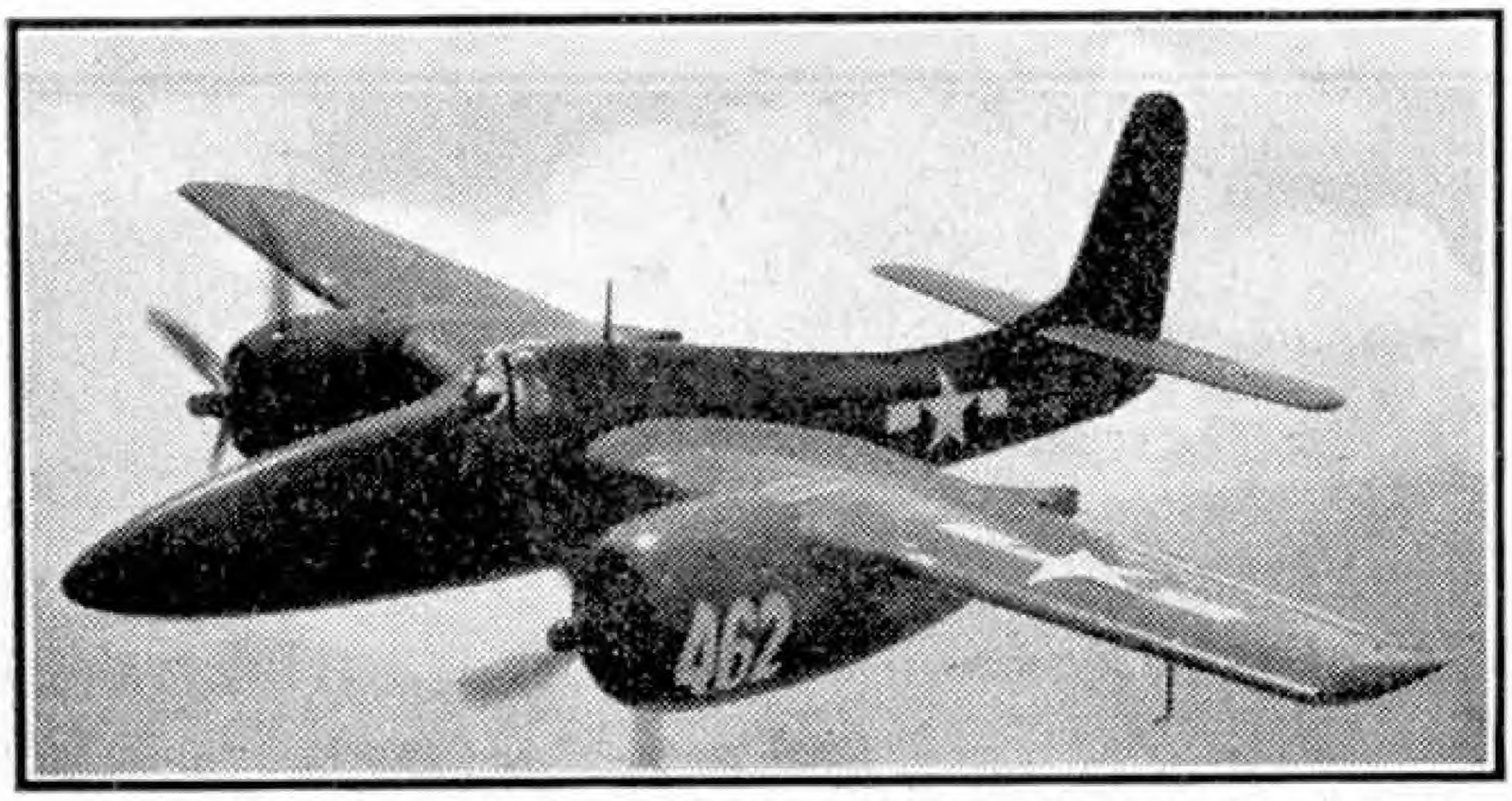
The XF-12 is nearly 100 ft. long, and with a wing span of 129 ft. 2 in. it is the first large aircraft ever designed for P.R. duties. It has four 3,000 h.p. Pratt and Whitney "Wasp Major" engines, and a good idea of its size can be gained from the fact that each engine nacelle is almost as big as the fuselage of a Republic "Thunderbolt" fighter. Each engine has two General Electric turbo-superchargers and drives a 4-bladed propeller. It is claimed that the machine can operate at high altitudes at speeds comparable with wartime fighters. J.W.R.T.

New Grumman Fighter

A new fighter aircraft now in service with the U.S. Navy and Marine Corps is the Grumman F7F "Tigercat." It is in a similar class to the British "Sea Hornet" but is bigger, more heavily armed, and consequently has a slightly lower performance. It would seem, however, to be the perfect Naval fighter, for it has an armament of four 20 mm. cannons, four .50 in. machine-guns, and either rockets, two tons of bombs or a torpedo—all this combined with a top speed of 425 m.p.h. and a mile-a-minute climb from sea level.

The "Tigercat," illustrated on this page, is in fact the most powerful Naval fighter in service to-day, as each of its two Pratt and Whitney "Double Wasp" engines develops 2,100 h.p. It has a span of 54 ft., but its wings fold upwards, in a similar manner to those of the "Sea Hornet," to facilitate handling and stowage aboard ship.

Normally the "Tigercat" is a single-seater, but there is also a two-seater night-fighter version, the F7F-2N, fitted with extensive radar equipment and designed to make things just as unpleasant for an enemy at night as the F7F would in daylight. J.W.R.T.



Grumman F7F "Tigercat" Naval fighter, showing the long tapering nose. Photograph by courtesy of Grumman Aircraft Engineering Corporation, U.S.A.

"Fireflies" for Holland

During the war many exiled European pilots flew British warplanes into action against the enemy, alongside squadrons of the Royal Air Force. Several squadrons have now returned home complete with all their aircraft and equipment. For instance, the Royal Norwegian Air Force is being reformed with a nucleus of "Spitfire" squadrons, as is the Czech Air Force; and the French have squadrons of "Spitfires" and "Halifaxes." All this is good for British prestige abroad and the results are beginning to be apparent.

On 18th January last, on the Fairey Aviation Company's aerodrome at Heston, the wife of Lt. Comm. Beets of the Dutch Admiralty in London christened the first of several "Firefly" fighters that have been ordered to re-equip the Royal Netherlands Navy. This was the first private sale of military aircraft by a British firm since 1939, and promises well for the future. After the ceremony "Fireflies" were flown by Dutch Naval pilots who expressed great satisfaction at the machines' handling qualities. J.W.R.T.

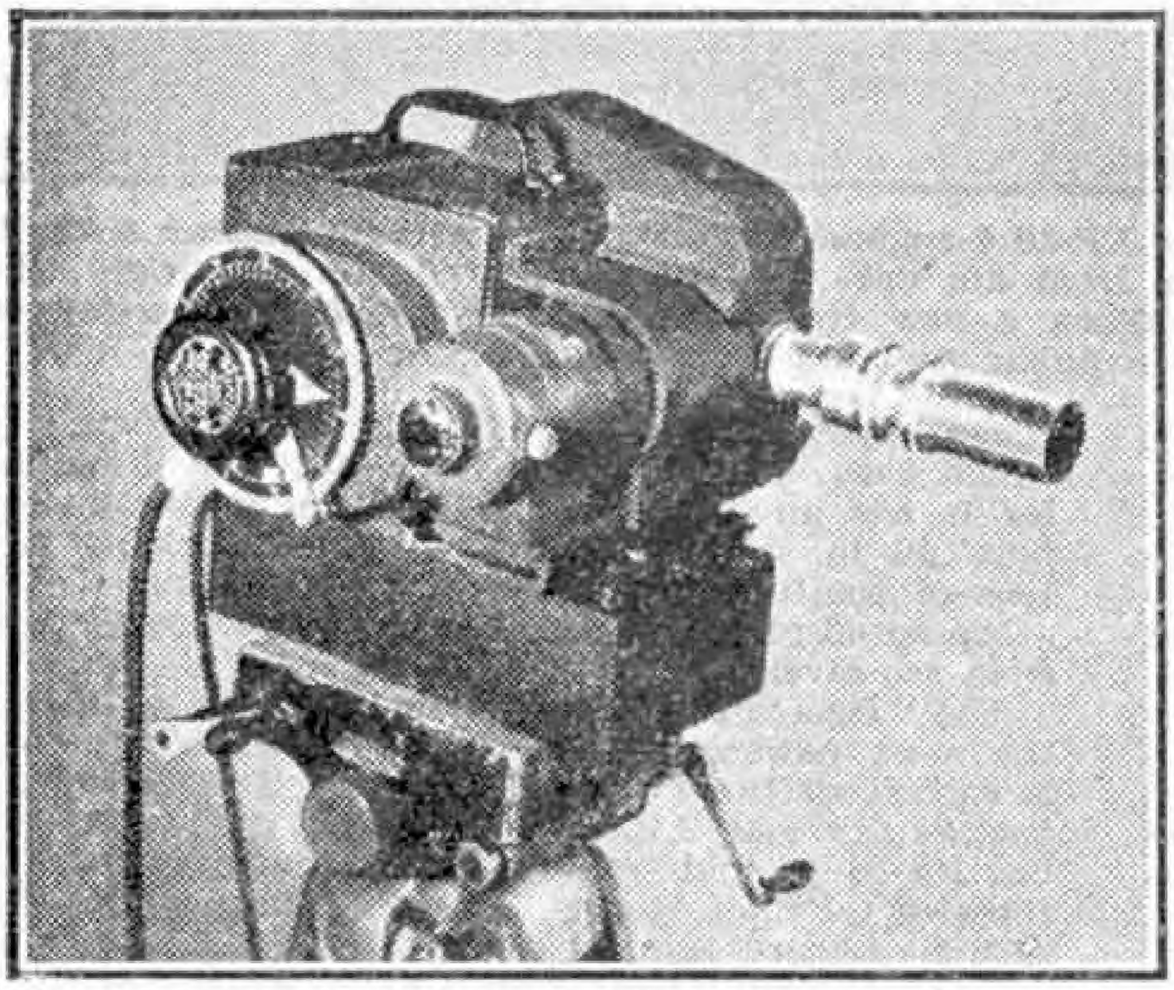
* * * *

The construction of a large new airport at Chicago is under consideration. It is planned to lay down 12 runways, four of them 7,700 ft. long, and the others 6,150 ft. long.

A Unique High Speed Camera

By H. F. Howson

TO take 3,000 photographs a second sounds impossible, yet a camera exists that operates at that speed. Ordinary motion pictures, as we know them in the theatre, are taken by cine-cameras at the rate of 24 per second, the camera using 100 ft. of film in about 2½ min. The Eastman High Speed camera passes 100 ft. of film in just 2 sec. It is manufactured by Kodak Ltd., and is, of course, a special instrument. Rapid machine motion can be photographed with it, and the exposed film subsequently projected in slow motion, as it were, for careful analysis.



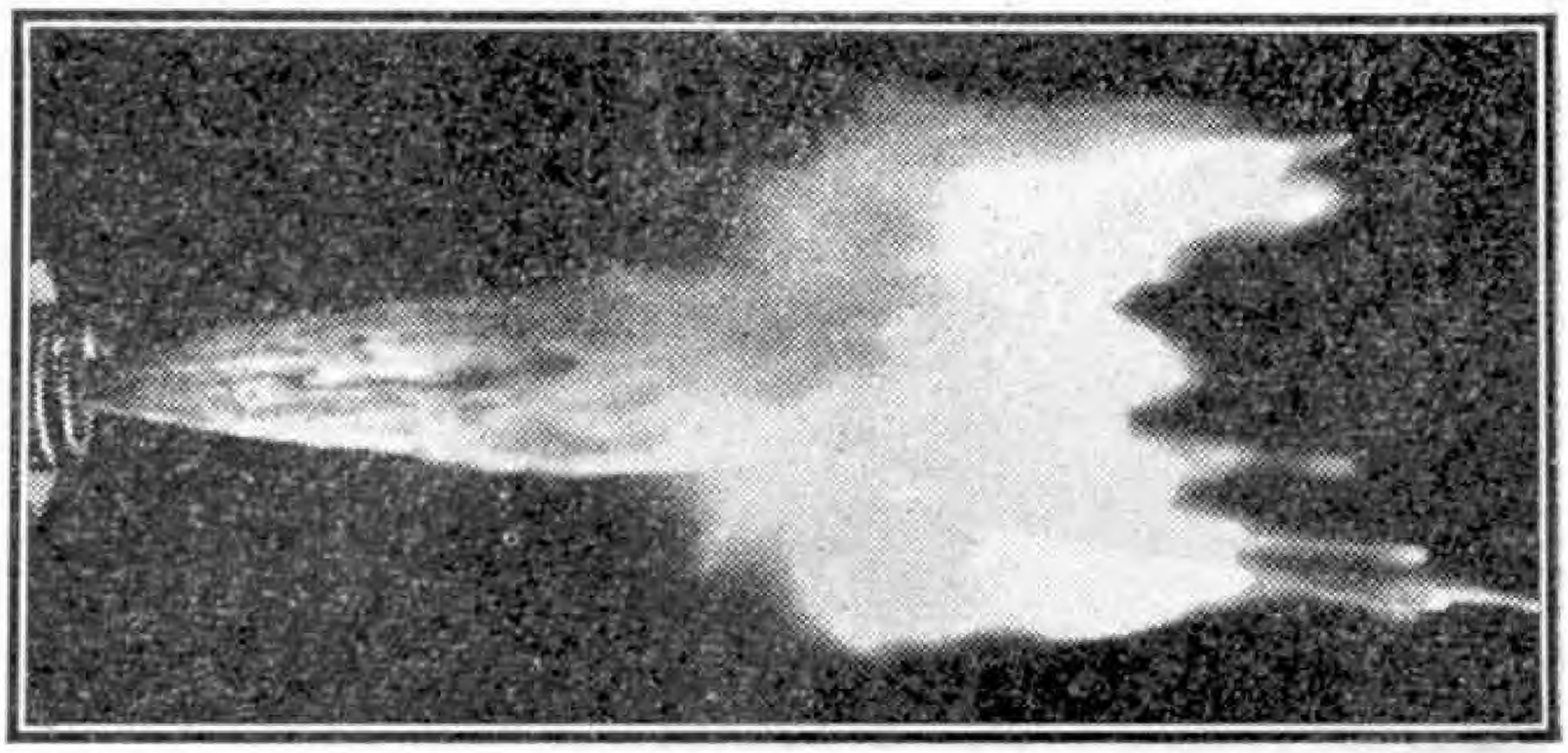
The high speed camera described in this article. Our illustrations are reproduced by courtesy of Kodak Limited.

The Eastman camera differs greatly from the ordinary cine-camera in one important respect. In the latter the film moves intermittently, stopping for the actual exposure and moving only when the shutter is closed; in the Eastman camera the film does not stop, each picture being recorded while the film is in motion. The mechanism that makes this possible is situated just behind the special lens. Without it, it would be impossible to obtain such rapid pictures, for no film could stand the strain of being stopped and started at such speeds.

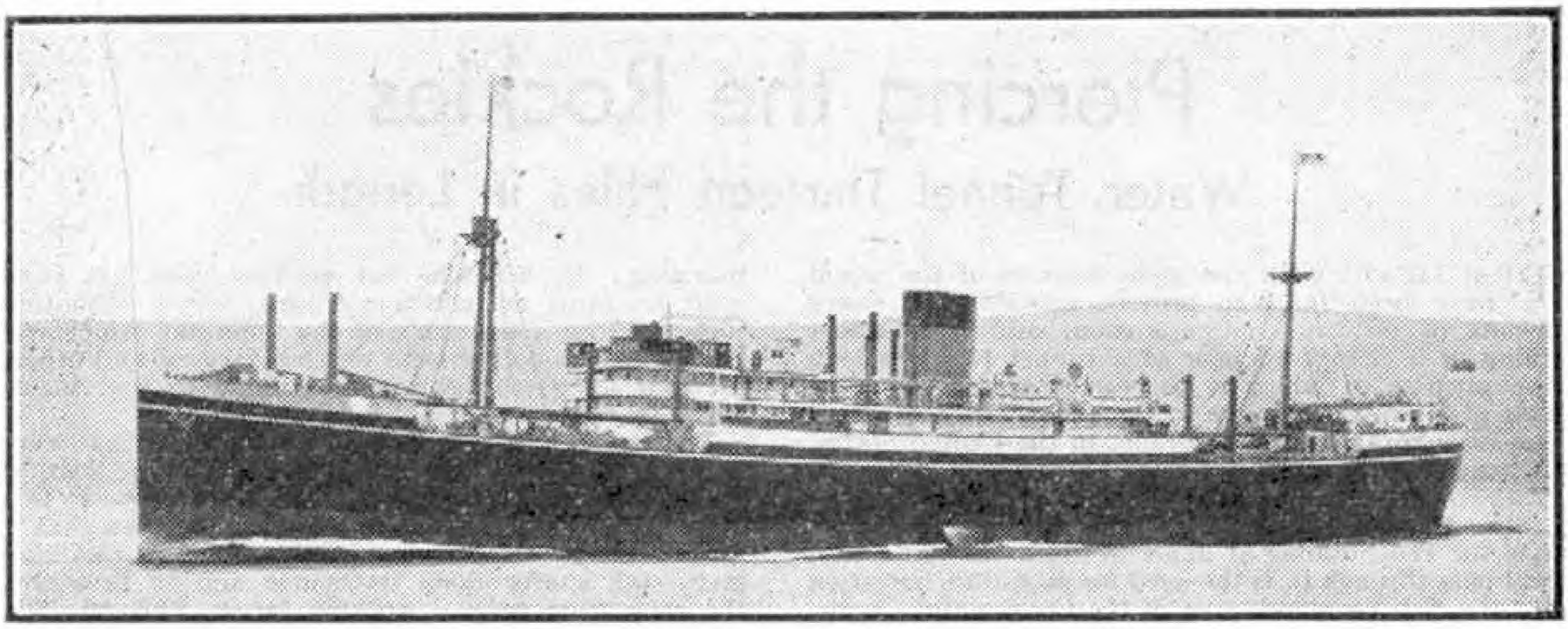
The mechanism consists of a rotating shutter shaped like a drum, with part of the curved sides cut away. In this space is mounted a glass block, or prism, which revolves with the shutter. At the moment the shutter opens, the image produced by the lens passes obliquely into the prism, emerging at a higher plane than that of the lens. The film frame, or picture space, is at the top of the gate aperture, and level with the image. As the prism turns, it lowers the image at the same speed as the film moves downwards. In short, the image follows the film. Even with this prolongation of exposure time, each picture is exposed only one 12,500th part of a second at approaching maximum speed.

Let us presume the camera is photographing an aeroplane propeller, rotating against air pressure. A film is taken at high speed and projected later at low speed. The propeller will thus appear to be moving very slowly, and the degree of distortion can be noted, or even measured, by comparing enlarged pictures cut from different parts of the film.

To prevent the film from breaking at great speeds, the camera's electric driving motor accelerates smoothly through resistances. In one second a speed of 2,400 frames per second is reached, using 30 ft. of a 100-ft. roll-film. The remaining 70 ft. pass through in one more second at a gradually increasing speed.



A fuel injection jet in action. The high speed camera has "frozen" the spurting fuel.



The Gallant Malta Convoy

By Denis Rebbeck, M.A., M.Inst.N.A., A.M.I.Mech.E.

IN August 1942, when the position of Malta was critical, food for the population and petrol for the "Spitfires" became the paramount necessity. In consequence, a fleet of ships, among the finest in the Merchant Navy, was collected and dispatched with naval protection. It was fully appreciated by all concerned that the naval protection was far from adequate, particularly as regards air cover. In this convoy were three of the latest and fastest motor cargo vessels of the Shaw Savill fleet, the "*Waimarama*," illustrated on this page, the "*Wairangi*," and the "*Empire Hope*." These ships had been built by Harland and Wolff Limited, and were completed in 1938, 1935 and 1941 respectively; they were all of 12,000 tons, and had come to be known as "Empire Food Ships," having been designed specially for the Anglo-Australasian Trade. All three were sunk in that gallant convoy.

The "*Empire Hope*" was first attacked by high-level bombers on the morning of 11th August, but escaped. In the evening the attacks were renewed. Submarines were about throughout the night, and on the following day the attacks made by high-level and torpedo bombers were continuous.

On the evening of the 12th massed attacks were concentrated on the "*Empire Hope*," and 18 near misses were scored in half an hour. These damaged the engines and made the vessel a sitting target, but she continued to fight back gallantly. The gun crews were blown out of the gun positions more than once, but each time they crawled back to their guns. Some of the crews were even blown overboard, but they swam back to the ship to continue their barrage.

Two direct hits then set the ship on fire. One fire ignited the cargo of kerosene; another started in the hold containing explosives. Near by was stowed a large quantity of bagged coal and this was thrown upward by the force of the explosion, the dust being driven deeply and painfully into the men's skins. Some of the lifeboats were half full of coal dust as they hung at the davits, but they were all got safely away, and in spite of all that the crew had been through the only casualty was one broken wrist.

The end of the "*Waimarama*" was sudden and tragic. On the morning of 13th August she was hit by three or four bombs on and near the bridge, and bridge and everybody on it disappeared completely. The petrol cargo on board caught fire and the vessel was soon ablaze from end to end, going down within four minutes and leaving the sea around her aflame with burning petrol. H.M.S. "*Ledbury*" made gallant attempts to rescue the survivors, but most of them, including the Captain, were lost.

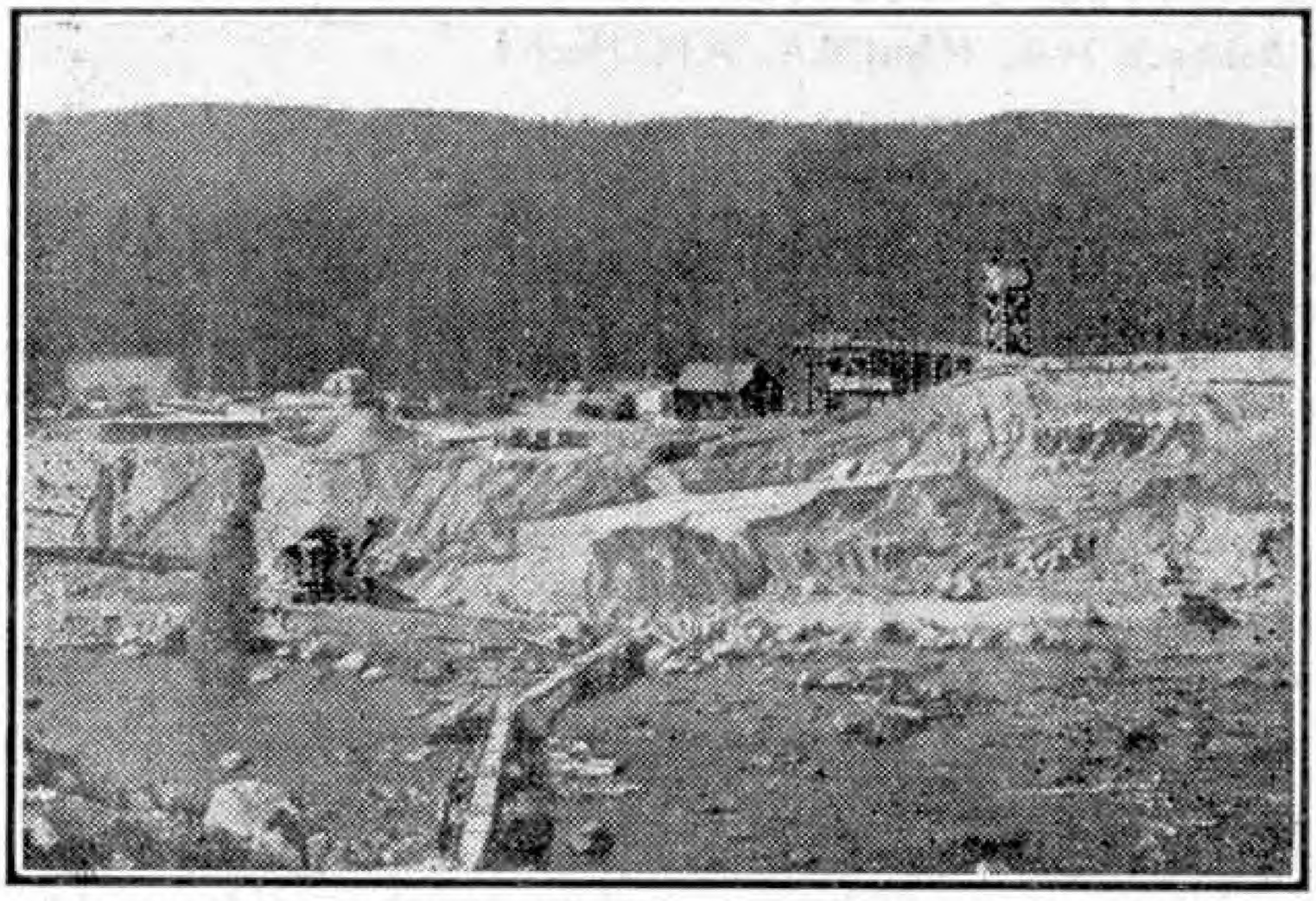
On the morning of 12th August, the "*Wairangi*," when a mile and a half from Cape Bon, was hit by a torpedo fired from an enemy M.T.B. The main engines stopped and the inflow of water was found to be beyond the capacity of the pumps. As it was hopeless to attempt to tow her in face of constant attacks, she was scuttled so as to prevent the ship and her cargo of munitions from falling into the hands of the enemy. Her entire crew were saved by the destroyer "*Eskimo*."

Piercing the Rockies

Water Tunnel Thirteen Miles in Length

PRACTICALLY all the great tunnels of the world have been built to provide quicker and easier means of railway communication, and it is something of a change to hear of a tunnel 13 miles long the purpose of which is to convey water from one side of a mountain range to the other. Such a tunnel has been completed in Colorado, in the United States. It penetrates the Rocky Mountains, and in consequence has earned the name of the Continental Divide Tunnel.

The reason for the construction of this great tunnel, and for the building of dams to store the water that will pass through it, is the need for providing irrigation for the rich farmlands east of the Continental Divide. There the valleys are green and fresh in early summer, but the immediate water supply usually runs out later in the year, and the result in the past has been annual losses of millions of pounds in the value of crops that they produce.



Constructional activity on the site of Shadow Mountain Dam, Colorado. The concrete plant is seen in the background. Photographs by courtesy of the Gates Rubber Co., Inc., Colorado.

There is ample water on the western side of The Continental Divide, where the Upper Colorado flows and unites with other streams to form the great river that runs south westward through Boulder Dam to the Pacific Ocean. The great problem was to make this water available to the East. Nearly 60 years ago schemes for taking the water across the mountains were sought, but surveys showed that nothing could be done without constructing a tunnel. From time to time the scheme has been further considered, and only now is it becoming a reality.

In any irrigation plan of this kind the water must be made to flow easily, and either without pumping at all, or with as little as possible, for lifting water is expensive. Finally it was decided that use should be made of Grand Lake, on the western side of the divide, and the tunnel has been driven from this lake right under the mountain. Grand Lake is small, and it is set in a region full of scenic beauty that has been constituted a National Park. For this reason another and larger lake to feed Grand Lake is being formed by the construction of a great dam, and this in its turn will be fed from a reservoir farther down the Upper Colorado, a plan that involves pumping. In addition yet another dam has been built to form an additional lake, Green Mountain Reservoir, on a tributary of the Colorado, which will store water to compensate western farmers and others for that diverted through the tunnel to the thirsty lands to the east.

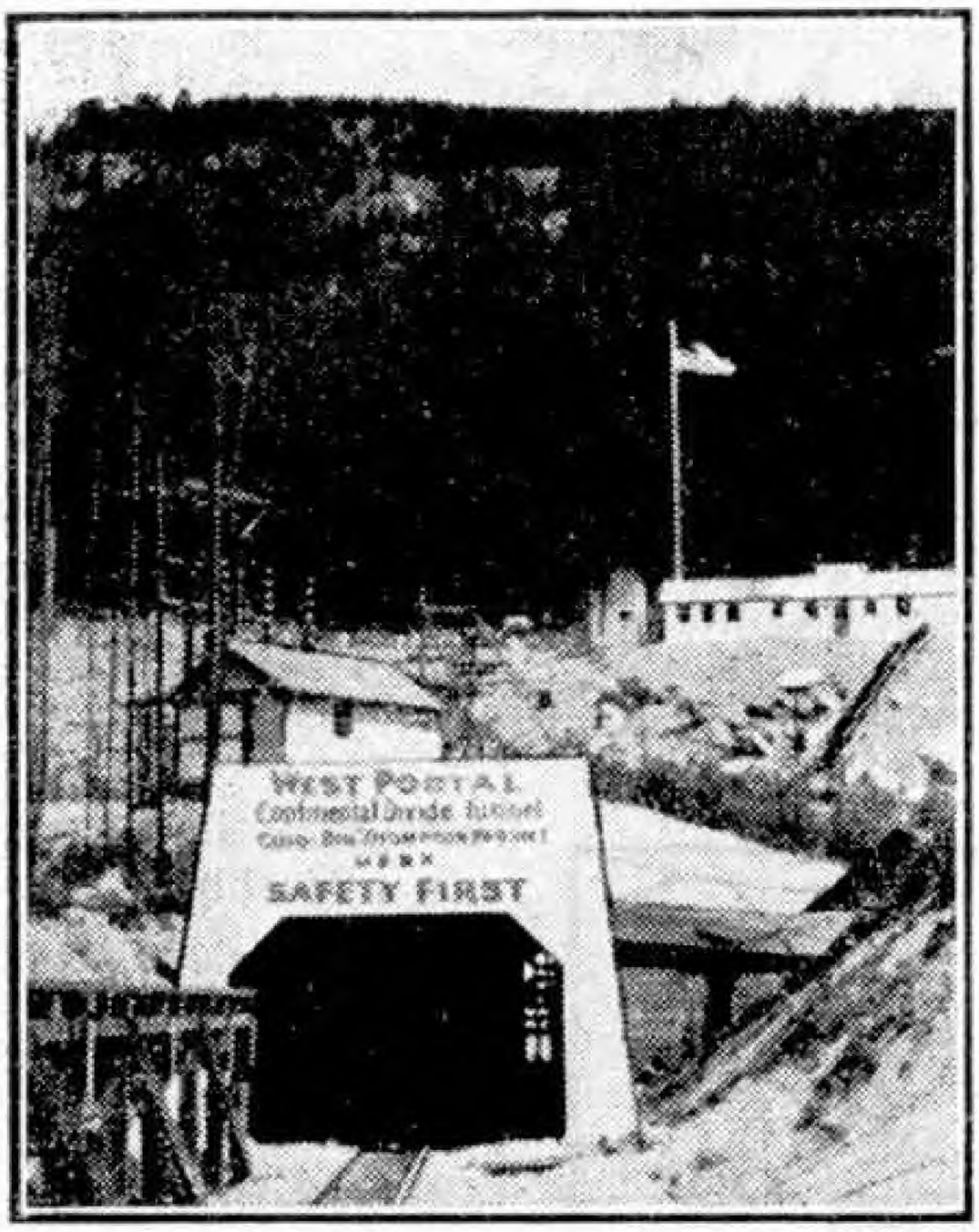
The tunnel has been driven by methods that have become familiar through application to various schemes in the United States and elsewhere. It is a little more than 13 miles in length. The plan that is usually followed in driving a long tunnel of this kind is to sink shafts along its course and so to attack the rock from several working faces. This one was driven simultaneously from the two ends only, however, and it is the longest ever driven in this manner. When the two sections met, so accurate had been the surveying and lining up that there was a difference of only $\frac{3}{4}$ in. between the two sections vertically and $\frac{7}{16}$ in. horizontally. In other words the total error was so small that it could have been covered by a shilling.

Giant "Jumbos" were used at the faces where the work was carried on. These were heavy cars, made to fit a narrow gauge track laid down in the tunnel, on which compressed air drills were fixed. In every round of drilling from 34 to 42 holes were driven, those in the centre being drilled to a depth of 9 ft. and sloped inward, while the holes around them were drilled to a depth of 7 ft. and sloped slightly outward. Then the holes were loaded with dynamite and fired.

The firing was done in accordance with a fixed plan. The charges in the central holes were first exploded. Then those to the right and left of the V-shaped opening so formed were fired, after which the outermost holes in turn were broken out. Delayed-action blasting caps were used to ensure that the correct order was followed in every round of blasting. The process was completed by picking up the rock after it was blasted by means of special mechanical shovels, and removing it on trucks running on the narrow gauge track.

The total length of the holes drilled was 480 miles, and the work was done with compressed air carried in from the portals through a 6-in. pipe. Each round of drilling, shooting and loading the spoil for removal required something under three hours to complete, and advanced the face of the tunnel about 6 ft., the record for one day of 24 hours being a length of 74 ft. of tunnel.

Special arrangements were necessary to keep the air at the tunnel face clear, especially as the bore made its way deep into the heart of the mountains. Four huge blowers were used in conjunction with a large pipe line. These were reversible, and there was one at the portal and three others at intervals along the line. When a crew in the tunnel were ready to blast they would retire to a safe distance, touch off their charges electrically, and then telephone to the control point at the portal. This was the signal to start the blowers in operation sucking the air from the heading, and the fumes were then removed so rapidly that the tunnel face was clear of



The west portal of the 13-mile tunnel driven directly through the Rockies to bring water from the Colorado River to the eastern side of the Continental Divide.

them by the time that the crew returned on their motor, although they started immediately after telephoning. After sucking out air for 20 minutes the blowers were reversed to bring fresh air into the heading.

There was no difficulty with water on the eastern side of the tunnel, for the floor slopes downward in this direction, and water making its way through the rock formations flowed away naturally. On the western side the tunnel slopes downward into the mountains, and there water would have accumulated at the face if a good pumping system had not been set to work. On one occasion a flow of 2,500 gallons a minute was encountered, but this was pumped away and the surroundings of the bore were sealed by pumping neat cement under a pressure of 1,400 lb. per sq. in. into holes drilled into the rock.

Where necessary the tunnel walls were held up by steel supports. Other sections were sprayed with cement, which was used to stiffen a particular type of granite that became crumbly on exposure to the air. The cement was applied immediately the rock was encountered in order to exclude air, so that the original hardness was retained. Finally the tunnel was lined with concrete of sufficient thickness to leave a tubular opening 9 ft. 9 in. in diameter through which the water will eventually flow.

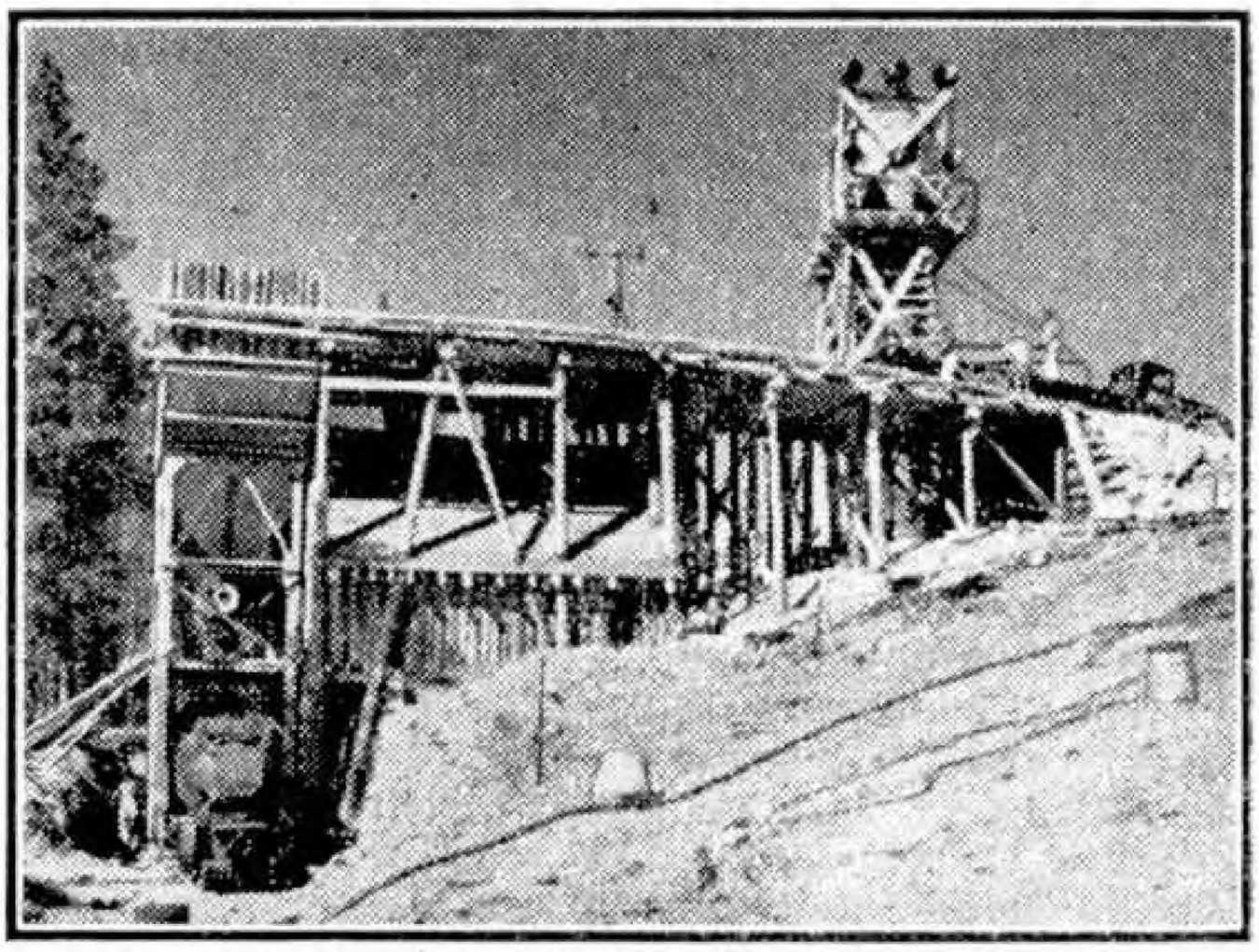
Concrete for the tunnel lining was mixed in the tunnel itself, and fed into a machine that pumped the resulting concrete into the space between the tunnel walls and a tubular form that held it in position until it was set. The form was constructed in sections that could be collapsed inward for removal. The concreting was begun in the middle of the tunnel and continued backward to the portal, so that as the concrete behind the innermost section set, this part of the form was collapsed and removed for erection at the outer end of the form. Thus section by section the form crept slowly backward as the concrete set.

While this work was being carried on there was great activity on the western side of the mountains. The first task there was to begin building the dam forming the new lake to keep up the supply of water in Grand Lake. This is being constructed of earth and rock, layer after layer of carefully selected materials being wetted and rolled to consolidate them. The concrete spillway was the first part to be constructed, for the river had to be diverted through it while the dam itself was being built across its course.

The new lake to be formed behind this dam has been given the name Shadow Mountain Lake. Further down stream is the site of Granby Reservoir, to be formed by building Granby Dam, 310 ft. high and also of earth and rock fill construction. Behind this dam there will be the largest lake in Colorado when the scheme is in full operation. From it 1,100 cu. ft. of water will be pumped up every second to a canal 185 ft. higher, along which it will flow into Shadow Mountain Lake. By these measures a regular and plentiful supply of water for Grand Lake will be provided, and so ample water for passing through the tunnel to the east will be available.

At a distance of 32 miles down the Colorado river is the mouth of the Blue River, a tributary of the great stream, and 16 miles up this is the site of the third of the great dams forming part of the scheme. This is Green Mountain Dam, again of earth and rock, and 270 ft. in height, which was rushed to completion in 1943 in order to provide power that might be required for war purposes. It is one of the highest and largest dams of its type in the United States. In addition to storing water for compensation it provides power through two hydro-electric generating units, each of 9,600 kW capacity. Thus water that formerly just ran away down to the sea in the spring floods is now held up and released as required, and in its release it provides valuable power.

The first water to flow through the tunnel on the completion of the scheme is to be carried through a temporary conduit directly to the Big Thompson River, from which it will flow through the irrigation ditches of the eastern farm lands. Eventually, however, the water will be made to do useful work in its tremendous drop of 2,974 ft. from the east portal, high up in the mountains, to the plains far below. Plans have been made for the construction of great hydro-electric power plants at intervals, while storage reservoirs at various points will retain reserves of water for feeding into the irrigation streams when required.

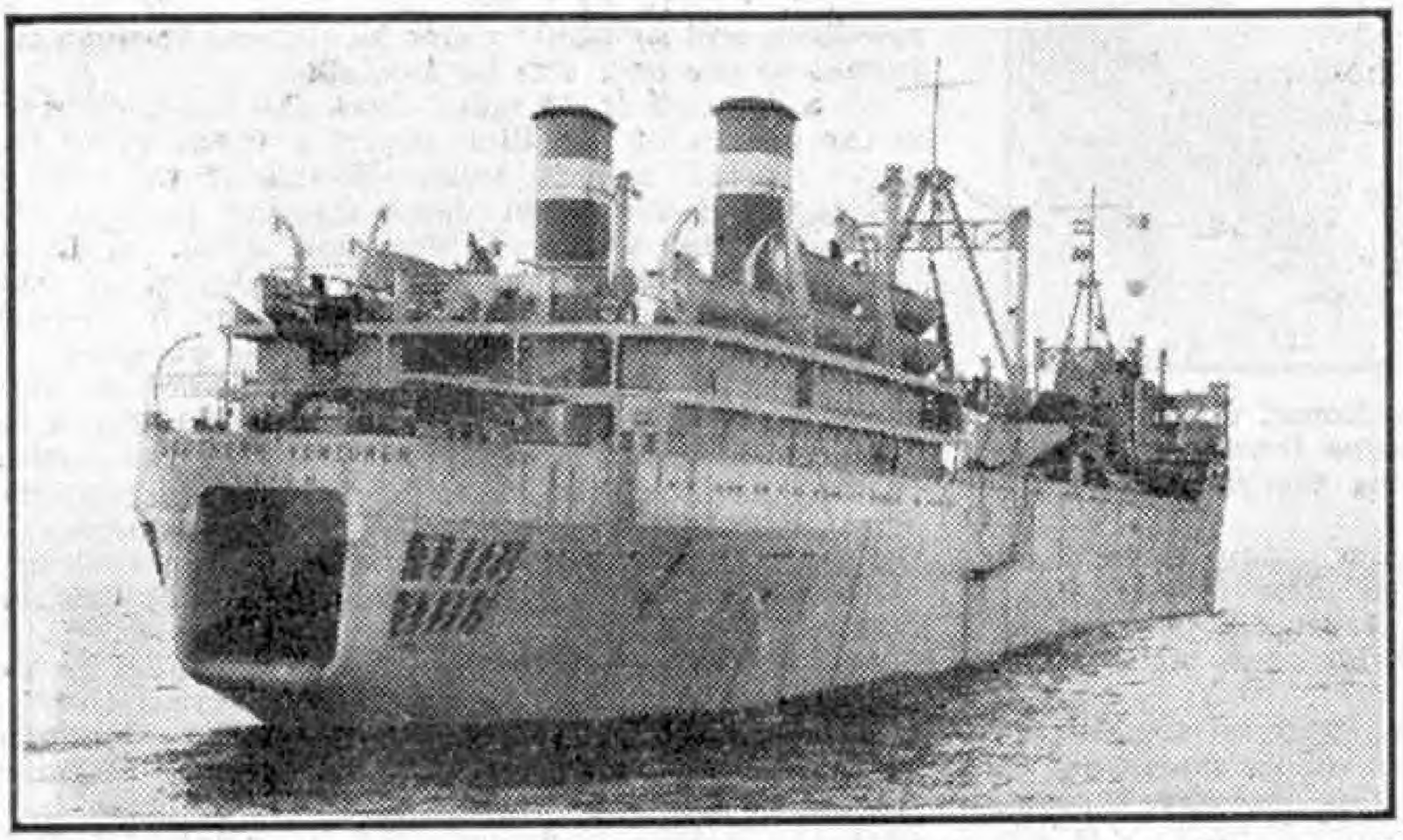


The concrete mixing plant for Shadow Mountain Dam.

Engineering Notes

Test Boiler for Turbine Engines

A high-pressure and high-temperature boiler for supplying steam for testing naval or mercantile turbines has been designed recently by Foster Wheeler Ltd., for a new test and research station at Wallsend-on-Tyne. This special boiler is designed to deliver superheated steam at a pressure of 1,200 lb. per square inch, and is fitted with special superheat control extending through a range from saturation temperature up to the designed maximum output of the boiler. It is fired by twin-furnaces and has a surface type superheater built as a unit with the boiler setting. The boiler is capable of generating sufficient high-pressure steam to meet the heaviest demands for testing modern turbine propelling machinery.



The "Southern Venturer," a fine modern whaling factory ship. It was built by The Furness Shipbuilding Company Ltd., to whom we are indebted for our illustration.

A Fine Whaling Factory Ship

One of the first two whaling factory ships built in British shipyards since the war is shown on this page. This is the *"Southern Venturer,"* which together with her sister ship *"Norhval"* was built by the Furness Shipbuilding Co. Ltd.

The *"Southern Venturer"* is 535 ft. in length and has a gross tonnage of 14,066. Its factory equipment is capable of dealing with over 600 tons of whale meat in 24 hours, and its storage tanks for whale oil have a combined capacity of 19,760 tons. When at sea the vessel carries a crew of 108, and in addition 150 factory workers and 134 catchers.

The whales are hauled from the sea through an aperture in the cruiser stern of the ship, which leads to a skidway passing up through the engine room casing to the upper deck. The huge carcasses are gripped by great toggle-jointed tongs, and are drawn up the skidway by 40-ton winches to what is known as the flensing deck, where the preliminary cutting-up operations are carried out.

100 Million Volt X-Ray Machine

The General Electric Company have produced at their works at Schenectady, United States, a 100 million volt X-ray machine. Its main feature is a huge glass toroid or hollow evacuated glass ring 74 ft. in outside diameter, inside which is mounted a tungsten wire target from which the X-ray beams are released. Another component of the machine is an electric magnet weighing 130 tons, the purpose of which is to accelerate a stream of electrons circulating through the toroid.

An Interesting Omnibus in Australia

An interesting new design of passenger road vehicle is being introduced in Australia for use on long-distance services. The vehicle is known as the "Landliner," and is driven by two Ford V8 engines operating through four-speed gear-boxes. One engine drives the rear axle of the forward bogie, and is located in the bogie frame between the axles. The second engine is placed at the rear end of the vehicle and drives the single rear axle. This engine drives through a special gear-box fitted with a free wheel device, which allows the engine to idle when its extra power is not required to boost the main engine under heavy loads and gradients. Either engine can be started and run independently. This peculiar engine arrangement allows seats to be installed in the body over the power bogies and so makes the fullest use of the body space.

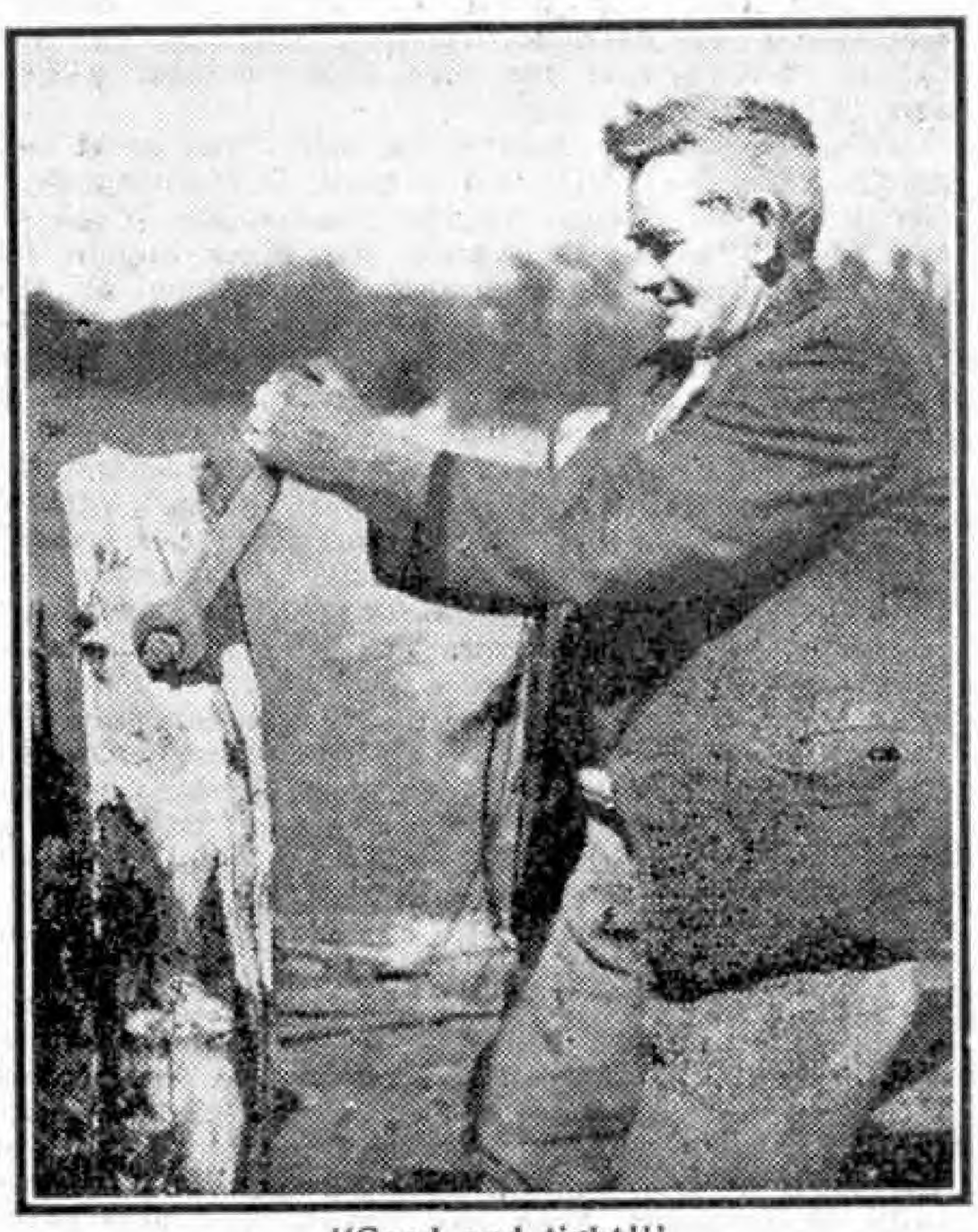
Photography

Action Portraits

By E. E. Steele

I ENJOY immensely taking pictures of people in action, even if they are only doing commonplace things. Sometimes they are aware that a photograph is being taken, but usually they know nothing about it because the camera is hidden except for the moment when the exposure is made.

The old lady about to fill her bucket was rather suspicious although I had planned to take the photograph unbeknown to her. The background of hollyhocks and the pump was attractive, and seemed to provide an ideal setting for the old-fashioned cottager. It is best to place yourself at the right distance and face the other way while you make



"Good and tight!"

the necessary adjustments to your camera, setting the shutter and the distance—already set permanently with the simple box camera—and then keep it behind your back until all is right for making a rapid exposure. I did this, but made my shot a trifle too early.

The photograph of the farm labourer is the kind you can often get by merely keeping your eyes open when out in the country. I was cycling along, looking for something to photograph, when I noticed the preparation for the new gate. It was an easy matter to pass the time of the day with the workman, bring out the camera and suggest a picture, asking him to give a good pull on the spanner while the exposure was made. This provided for a natural expression and a genuine feeling of action. The lens was not stopped down, so that the background is kept soft and subdued. This is often useful in portraiture, where a sharp background can detract from the portrait itself.

The photographer needs to be resourceful to obtain some photographs, as illustrated by my friend in the wheelbarrow. We were out cycling one day when the

The opportunist.

horse chestnuts were in flower, and he particularly wanted a photograph, but these flowers, on their tall, showy spikes, bloom out of reach when a close-up is required. A glance up the road revealed a road-mender's barrow, which was pressed into service, and made the photograph possible. My picture was made when my friend was focussing his camera, quite unaware that a photograph was being made.

Country woman in typical setting.

BOOKS TO READ

Here we review books of interest and of use to readers of the "M.M." With the exception of those issued by the Scientific and Children's Book Clubs, which are available only to members, and certain others that will be indicated, these should be ordered through a bookseller.

"LOCOMOTIVES OF SIR NIGEL GRESLEY"

By O. S. Nock, B.Sc.
(The Railway Publishing Co. Ltd., 10/6)

In introducing this book one cannot do better than quote Mr. O. V. Bulleid, Chief Mechanical Engineer of the S.R., who in the foreword writes: "This book is a comprehensive review of the work of the most notable English locomotive engineer of his generation . . . . . All locomotive men will thank Mr. Nock for producing so enjoyable and instructive an account." This sums up very happily a most comprehensive and interesting book.

The aim of the author has been to present a broad outline of the progress of locomotive design from the start of Sir Nigel's chieftainship at Doncaster in 1911 on the Great Northern Railway, through the developments of L.N.E.R. days, up to his sudden death in 1941. The book is not intended as a biography, but it gives an accurate character study of Sir Nigel Gresley, who was not only a great locomotive engineer, but also a great railwayman. Gresley's career as "Chief," moreover, has no exact parallel in British locomotive history, for it began in the spacious days of "one driver, one engine," when it was still possible to see single-driver locomotives on express work on the King's Cross main line, and it continued to the streamline period of modern times.

Mr. Nock is well known to "*M.M.*" readers for his articles on railway topics that have appeared in our pages from time to time over a long period of years. In particular readers will recall his joyous accounts of his footplate trips in pre-war days. His entertaining style and regard for accurate detail are well in evidence in this book.

The first two chapters deal with the old Great Northern days, the early Gresley designs and the well-known patent derived valve motion for 3-cylinder engines of which Gresley became such an advocate. Then follow the stages in the development of the Doncaster 2-6-0 locomotive and the remarkable work of the final G.N.R. design on very heavy passenger trains in the coal strike period of 1921.

This brings us to the "Pacific" era, which really began late in G.N.R. history, and to the comparative trials of 1925 between "Pacifics" of the L.N.E.R. and "Castles" of the G.W.R. on each others' metals, which resulted ultimately in the front-end modifications applied to the Doncaster product. Thus the complete story of the "A1" class is conveniently and logically carried right into the L.N.E.R. period. The author next deals with the immediate post-grouping period, reviewing the comprehensive trials of 2-cylinder and 3-cylinder engines, "booster" experiments on a G.N. "Atlantic" and the application of this auxiliary mechanism to the new 2-8-2 freight giants of 1925. The appearance of the mighty "Beyer-Garratt" in the same year and the development of the "J38" and "J39" 0-6-0s complete the tale of those interesting years.

Express passenger types then claim attention. The first Gresley 4-4-0s and 4-6-0s—"Shires" and "Sandringhams" respectively—are described, as are the noble-looking "A3s" and the unique "*No. 10000.*" Gresley was ever on the search for improvements. He was a keen observer of technical advances in engineering practice generally, and a thorough believer in careful tests and research. His greatness lay partly in the fact of his willingness to learn from experiments and experiences, not only on his own railway with his own engines, but from those of other engineers elsewhere. For this reason the story of his experiments and re-buildings of existing engines between 1927 and 1933 is of absorbing interest. Feed heaters, poppet valves and different methods of operating them, and the application of booster bogies to the former Great Central 0-8-4 tank design for hump shunting purposes are but a few of the individual items concerned.

Gresley did not make a fetish of excessive standardisation. Doncaster designs came into general use on the L.N.E.R. group by degrees, but where special needs existed his policy was to provide a design worked out to meet these, still retaining, however, the broad features of his normal practice. Similarly he made use of designs already in existence on the constituent lines of the L.N.E.R. where they met particular needs, and in various instances a programme of renewal and re-building resulted in increased efficiency being obtained from designs traditional on particular routes, such as the ex-G.C.R. 2-8-0s and the ex-G.E.R. 4-6-0s, 0-6-0s and "Claud Hamiltons."

Then we have a chapter on new types great and small, from the "N7" 0-6-2 tank, fundamentally a Great Eastern design, to the remarkable "*Cock O' the North,*" a 2-8-2 express passenger engine for the specially arduous running conditions of the Edinburgh-Aberdeen road, incorporating many of the features tried out in previous experiments, though still of course adhering to the broad general lines of established Gresley practice.

So we come to the peak of Gresley's achievements, the high-speed streamlined "*Silver Jubilee*" express of 1935 and the even more remarkable "*Coronation*" of 1937, in the haulage of which "A4" streamlined "Pacifics" made such a name for speed and reliability in the period before the war. The further development of the "big engine" policy covers the 2-8-2 express class in its then latest form, and the mixed traffic "*Green Arrow*" 2-6-2s, perhaps the most successful "all-rounders" in the whole series of Gresley designs. The concluding chapter deals with the "B17" 4-6-0s specially streamlined for the "*East Anglian*" service, the development of the class of "K4" 2-6-0s for West Highland duties, and finally the last Gresley design, the "V4" 2-6-2 "*Bantam Cock.*"

Strikingly good illustrations are a feature of the book, and there are diagrams and comparative tables of dimensions that add considerably to the interest and ease of reference. Throughout personal experiences with particular engines are included and they are accompanied by fully-detailed "logs" not only of distances, time and speeds, but also boiler and steamchest pressure readings, regulator and cut-off settings. An alphabetical index makes reference to any particular item very easy, and there is a well classified and fully-detailed index of the illustrations. The whole forms a most attractive record that will appeal to all interested in the steam locomotive, whether professionally or otherwise.

"STAMPS FOR ALL"

L. N. and M. Williams
(Vawser and Wiles. 2/- net)

This is an interesting book for the beginner in stamp collecting. It covers the ground quite well, beginning with a general talk on why stamps are collected and an explanation of the best ways of starting a collection and of handling and displaying stamps. Then follow explanations of the various kinds of stamps, with descriptions of famous designs, stamps with stories, and rarities. A brief account is given of stamp printing, perforations and watermarks, and a list of useful stamp books and magazines, with notes on stamp clubs and stamp dealing, completes a very useful little volume. There are four pages of reproductions of famous stamps.

Club and Branch News

WITH THE SECRETARY

EASTER EXHIBITIONS

Whatever the size of a Club it is important to show all who know of its activities something of the work that members are doing. This is best done by means of an Exhibition, and in the past Meccano Clubs have made wonderful displays that have attracted the admiration of relatives and friends of members. Now that Meccano Outfits are again obtainable, and Club activities are expanding, it is more important than ever to try to arrange a display, and the approaching holiday is as good a time as any for this purpose, since it marks the end of the Winter Sessions. I know that Easter Exhibitions have been planned in many Clubs, and I urge Leaders of Clubs that have not yet made any preparations for such a display to think over the possibilities at once.

The central feature of such an Exhibition must of course be model-building, and the display may vary from large impressive models built by members working together down to small individual models entered by members in a special Exhibition Contest. There should always be a Model-building Competition in connection with an Exhibition. Simple subjects should be set, especially at present, when the supply of Meccano Parts is still very restricted. It is usually a good plan to invite some interested visitor, perhaps already associated with Club work, to act as judge. This will leave officials and members the task of arranging for the display.

Small prizes of course should be provided, but Meccano boys will be more interested in the honour and thrill of winning than in the actual value of the awards. Such a contest too gives splendid opportunities for rivalry of a friendly kind between sections. Perhaps something in the nature of a Club model-building championship might be arranged with the object of adding to the general keenness.

A. F. Manners is Secretary of the Ranelagh (Liverpool) M.C., Leader, Mr. H. T. Barron. This Club was affiliated in August 1944, and made steady progress. Special features of its activities have been Model-building and Visits, and an excellent printed Magazine, "The Ranelian," edited by the Secretary has now been produced.

ADDED ATTRACTIONS

The display at such an Exhibtion should be supplemented by the products of other hobbies pursued by members. If a Club possesses facilities for displaying films or slides, then a short interesting lecture might be added to the attractions. One thing that should not be omitted is an information bureau, at which leaflets explaining the Guild and the Club movement can be distributed and details of the Club can be given by members themselves to all visitors, especially to likely recruits. I shall be glad to supply Guild and H.R.C. leaflets and other literature to interested Clubs, and cut-outs and streamers that will add brightness to the scene also are available.

CLUB NOTES

HILL CORNER (LEAMINGTON SPA) M.C.—Meetings are being held weekly, and members enjoy refreshments during an interval in activities. Models constructed have included a large bridge, and a miniature village is being made. Draughts, Dominoes and other games are played in addition to Billiards and Table Tennis, and a Hornby Electric Layout is in regular operation. Club roll: 8. *Secretary:* R. Bethell, 49, Prospect Road, Leamington Spa.

CAER URFA (SOUTH SHIELDS) M.C.—Successful Model-building continues and Competitions were arranged in connection with an Exhibition. The Canteen is now open and proving very successful. A discussion on "*Stamps*" has been held, and other meetings have been devoted to "Quiz" Contests. Club roll: 33. *Secretary:* G. Burrows, 113, Quarry Lane, Cleadon, South Shields.

MALLOW M.C.—Re-organisation of the Club is proceeding well and an Exhibition of models is to be held as soon as possible. It is hoped to visit the airport at Rineanna. Club roll: 7. *Secretary:* W. J. Roche, 6, Bellevue Terrace, Mallow, Co. Cork.

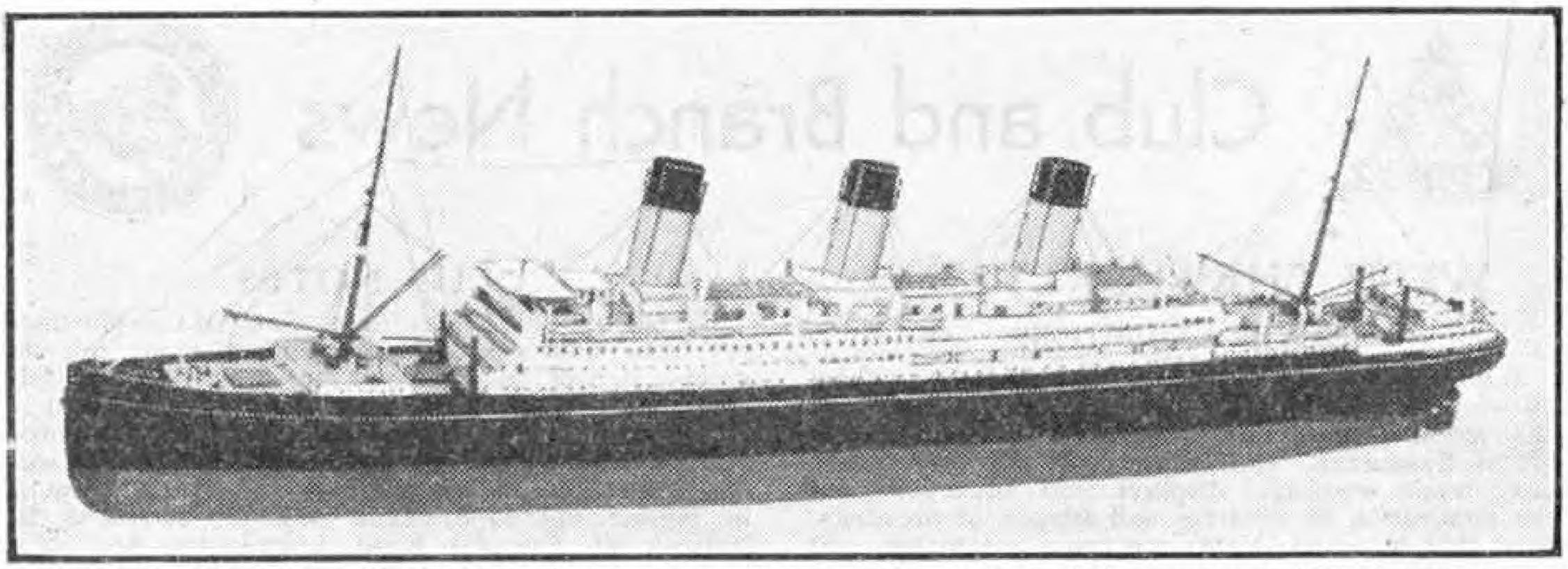
HENLEAZE (BRISTOL) M.C.—Both Model-building and Hornby Train Nights are well attended, and the greatest difficulty at the moment is lack of room. A very enjoyable party was held in the New Year, and an interesting Visit was to a point where a Bailey Bridge has been erected to span a gap caused by heavy seas. Club roll: 14. *Secretary:* M. E. Frost, 32, Oakwood Road, Henleaze, Bristol.

BRANCH NEWS

WATERLOO (DUBLIN)—Members continue to enjoy operations on the Branch Layout, which follows the lines of the East Kent Light Railway. Excellent timetable operations are carried out, and good work is being done in extending facilities and in providing electric lighting, etc. Recently many goods and live stock "Specials" have been run. *Secretary:* S. B. Carse, 38, Oakley Road, Ranelagh, Dublin.

HORLEY—Good track meetings have been held, with layouts providing double track and sidings for shunting operations. At a business meeting steps were taken to ensure that Club work of all kinds is carried out efficiently, both on the track and in the "offices." Slackness of any kind inevitably leads to lack of interest. *Secretary:* D. G. Wyatt, 65, Castle Drive, Horley.

CARDIFF DISTRICT—Good operations are carried out at Branch meetings, which are long enough to give members plenty of useful practice. New tracks are designed and discussed, and these are laid down when it is agreed that they will add to the fun of branch meetings. *Secretary:* G. G. Francis, 94, Ninian Road, Roath Park, Cardiff.



A beautiful scale model of the White Star Liner "Majestic." It is built to a scale of 100 ft. to 1 in.

Scale Models of Well-known Ships

Liverpool Man's Fine Craftsmanship

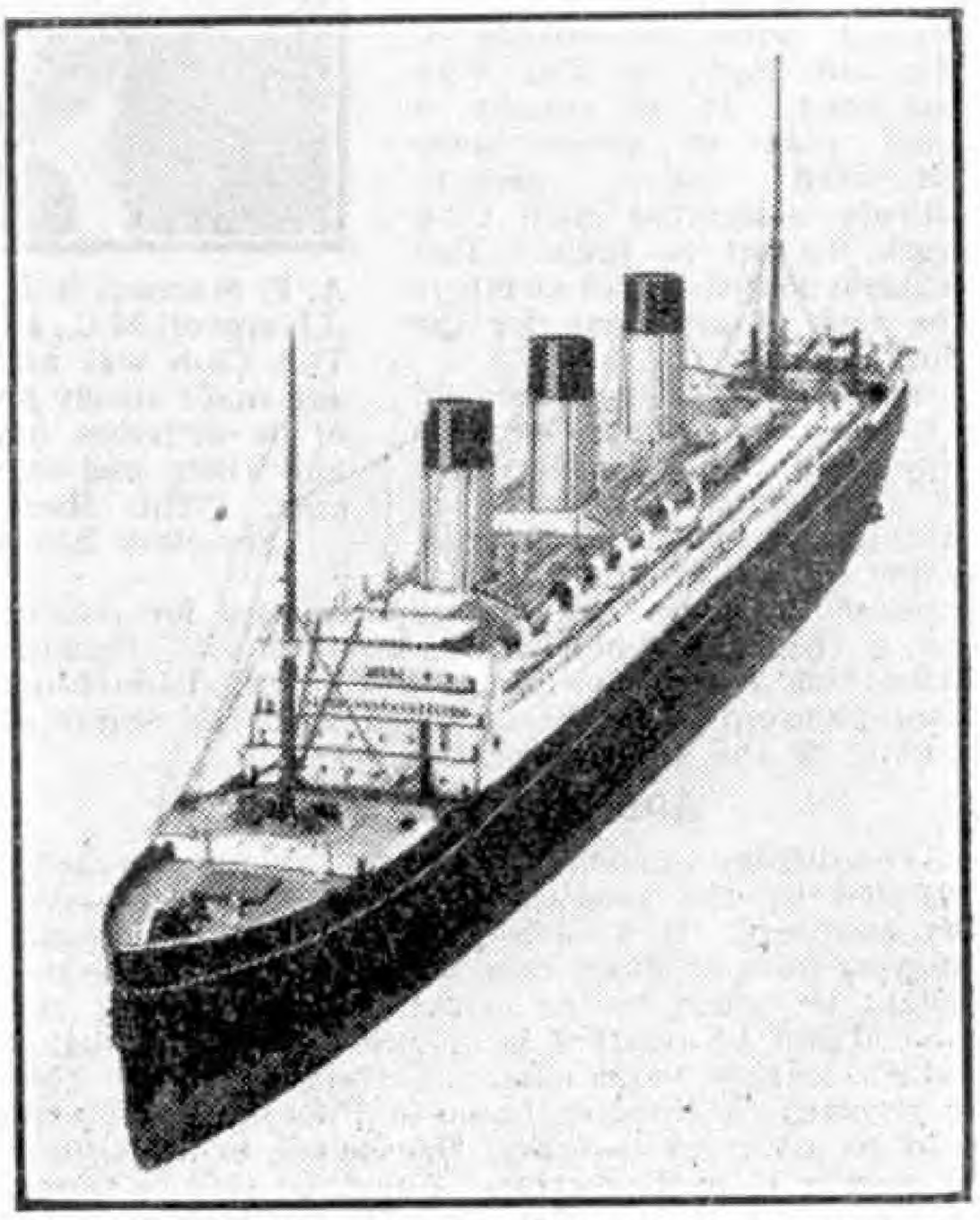
IN the January *"M.M."* appeared a description and illustrations of a remarkably realistic scale model dock layout designed and constructed in his spare time by Mr. J. Cowley, Liverpool. In addition to the dock layout with its interesting equipment, Mr. Cowley has built also fourteen models of well-known ships of all types, and this month we give some details of these and of the way in which they were constructed.

The ships are built to a scale of 100 ft. to 1 in. and some of them are shown in the illustrations on this and the facing page. All the models will float and they are so carefully constructed that their draught in water is practically in keeping with the general scale. This is a very remarkable achievement, in view of the great mass of detail work included in each vessel.

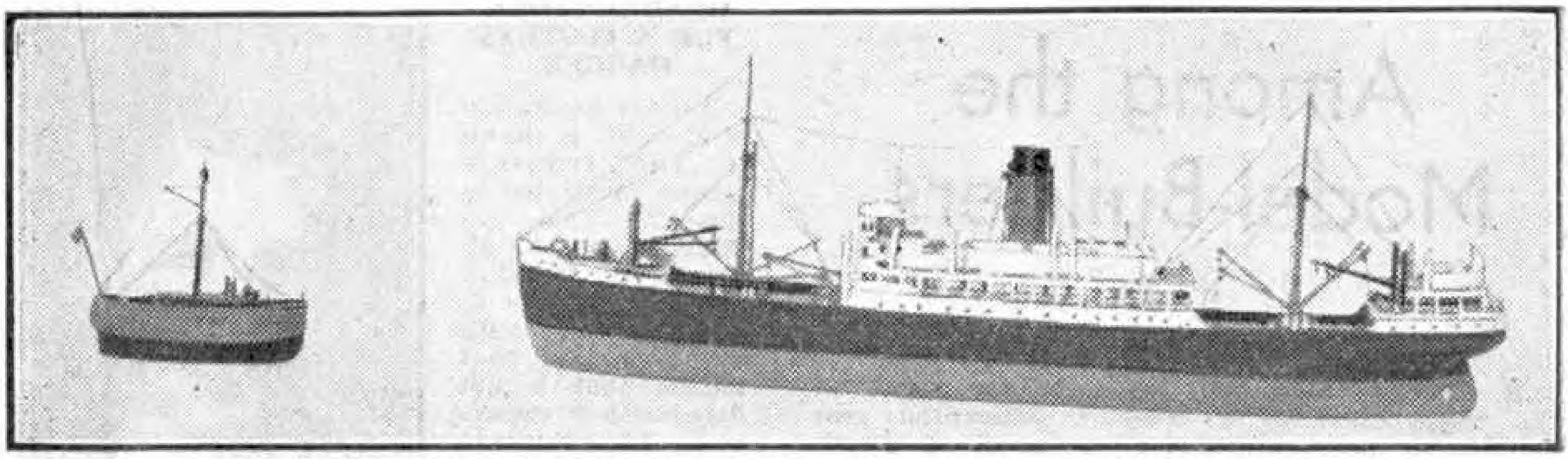
The model shown at the head of this page is of the White Star Liner *"Majestic,"* and is approximately 7½ in. long. Other vessels shown are the Blue Funnel Line cargo ship *"Idomeneus,"* the Danish iron-ore carrying vessel *"Beukelsjik,"* the well-known passenger liner *"Empress of Britain"* and a lightship typical of those to be seen at the approaches to any large seaport.

The hulls of the ships are of wood shaped exactly to scale plans and hollowed out with a penknife and a razor blade so that when completed they will float to correct draft line. This hollowing of the hull required much care and many actual testings in water, as the weight of superstructure had to be allowed for together with the final weight of the paint on the hull and the deck fittings. In some of the models the thickness of the sides of the hull is only $\frac{1}{16}$ in., and cross-beams are fitted to prevent them from collapsing under light pressure.

The main decks consist of thin card tinted to represent wood and ruled with a hard pencil to represent the planks. The deck houses are made of thin card

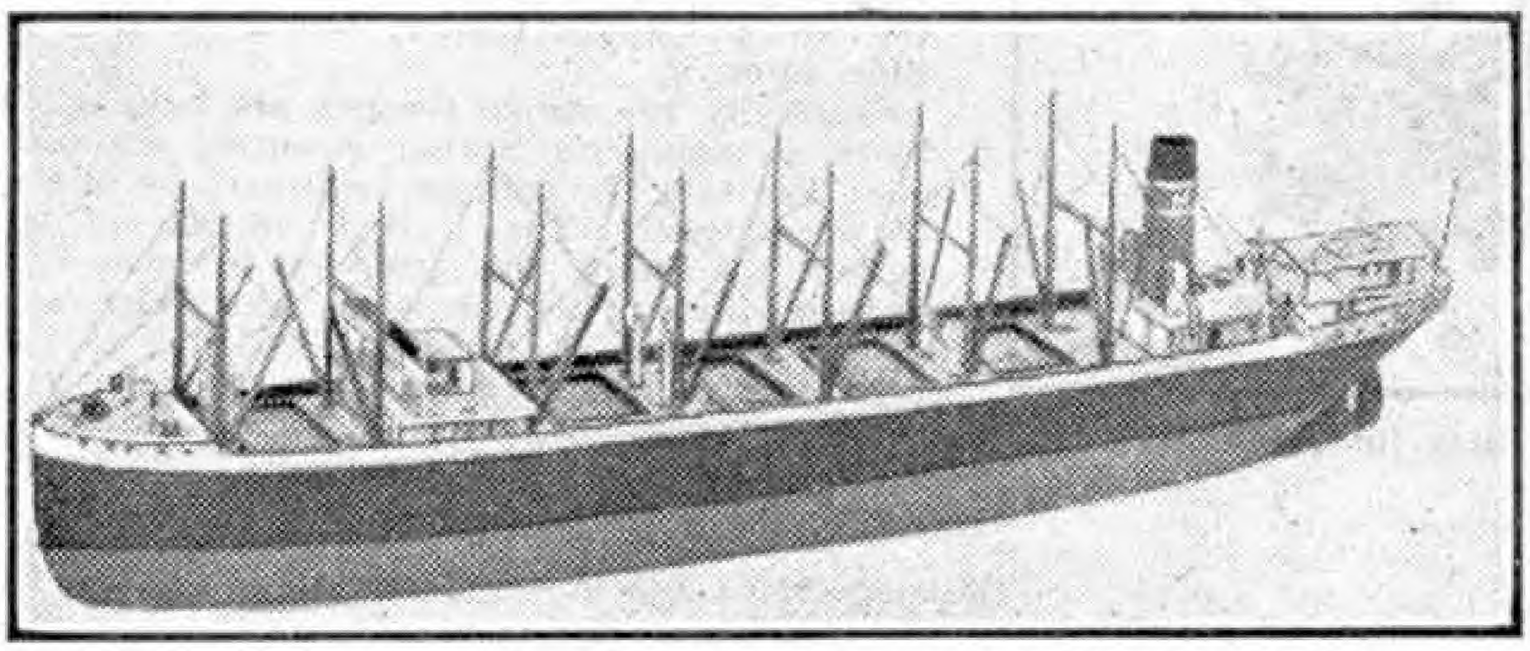


An "aerial" view of the "Majestic," showing the forward deck and the bridge superstructure.



Models of a typical lightship and the Blue Funnel cargo vessel "Idomeneus."

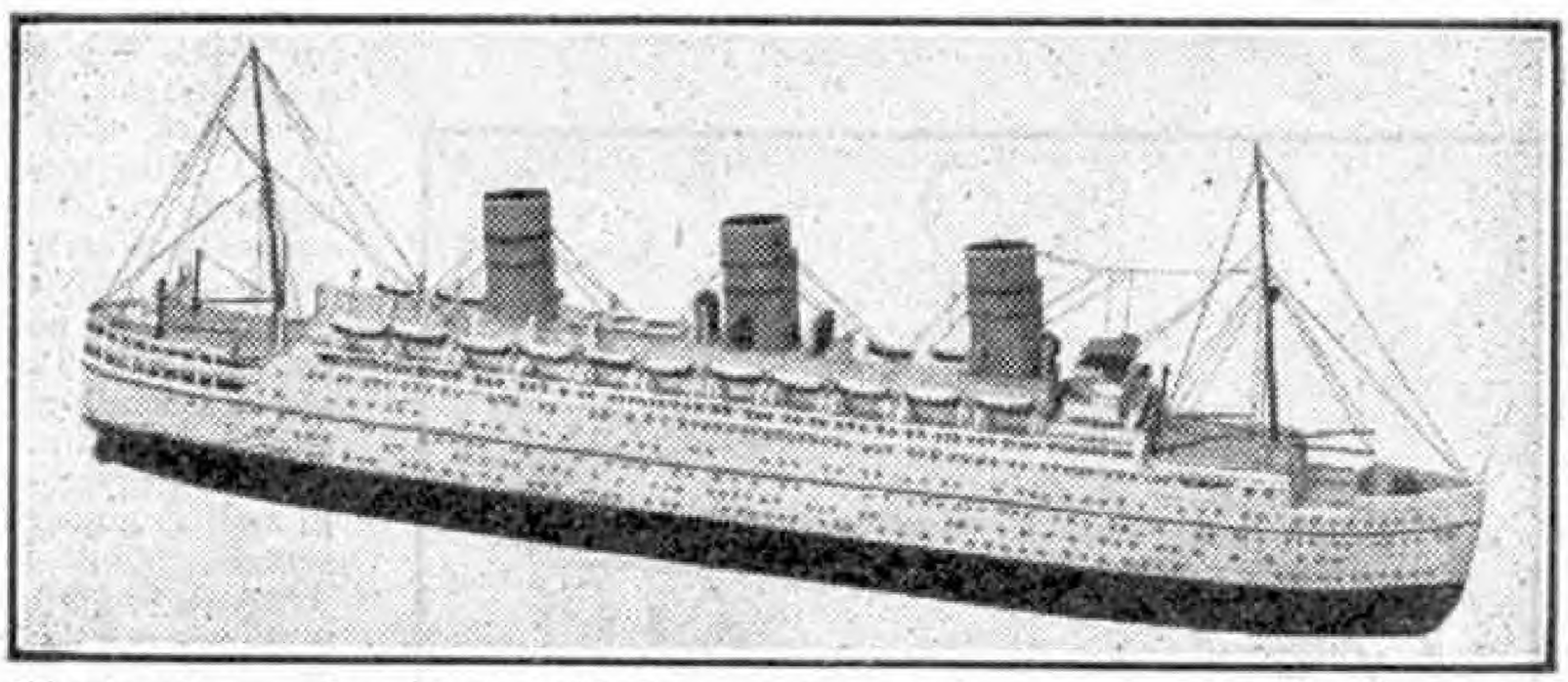
with windows painted on, and the port-holes were pierced with a needle. All the small fittings such as saloon doors and windows were completely detailed and painted in their respective colourings before they were fitted in place on the model.



A fine model of the Danish iron ore vessel "Beukelsjik."

The centre superstructure was next built up complete with funnels, ventilators and other details. Mr. Cowley says that in building models of this kind it is best to complete the centre sections first, as otherwise such delicate items as masts and derricks, small ventilators, etc., are liable to be broken off during the progress of the later work amidships. A difficulty which arose when fixing the awning stanchions was to get them all perfectly upright, and in ships with two or more decks to arrange those on the upper decks in correct vertical alignment with those on the decks below. Mr. Cowley says it took him about eight hours to fit 40 stanchions around the stern portion of the *"Empress of Britain,"* so he decided to find a quicker method for his later models. Eventually he got over the difficulty by first marking the positions of the stanchions, and then making a small hole with a fine needle to take a stanchion the height of the required number of decks. This meant that two or more stanchions were fitted at a time, and also made it easy to ensure that they were in vertical line with each other.

The funnels consist of paper tubes made on shaped wood formers, and the mast and funnel guy wires are very fine copper wire, such as that used in radio earphones. The wires are threaded through tiny holes in the top bands of the funnels and fastened to the decks by small sprigs of wood glued into holes in the deck. These sprigs are less than half the diameter of a pin, and are painted black, which gives them the appearance of pulley blocks lying on the deck. The pulley blocks on the cargo derricks are tiny blobs of Seccotine painted black. An ingenious method of making the anchor chains was used. These consist of cotton thread tied in a series (*Continued on page 128*)



Handwork worthy of an old-time craftsman is seen in this model of the "Empress of Britain."

Among the Model-Builders

By "Spanner"

A DIFFERENTIAL FOR SMALL CARS

R. Smalley, Newcastle, has asked for advice on the construction of a compact differential gear suitable for incorporation in a very small car chassis he wishes to build, and I think the mechanism shown in Fig. 1 should meet his requirements. A "spider" taken from a Swivel Bearing is fitted with two Pivot

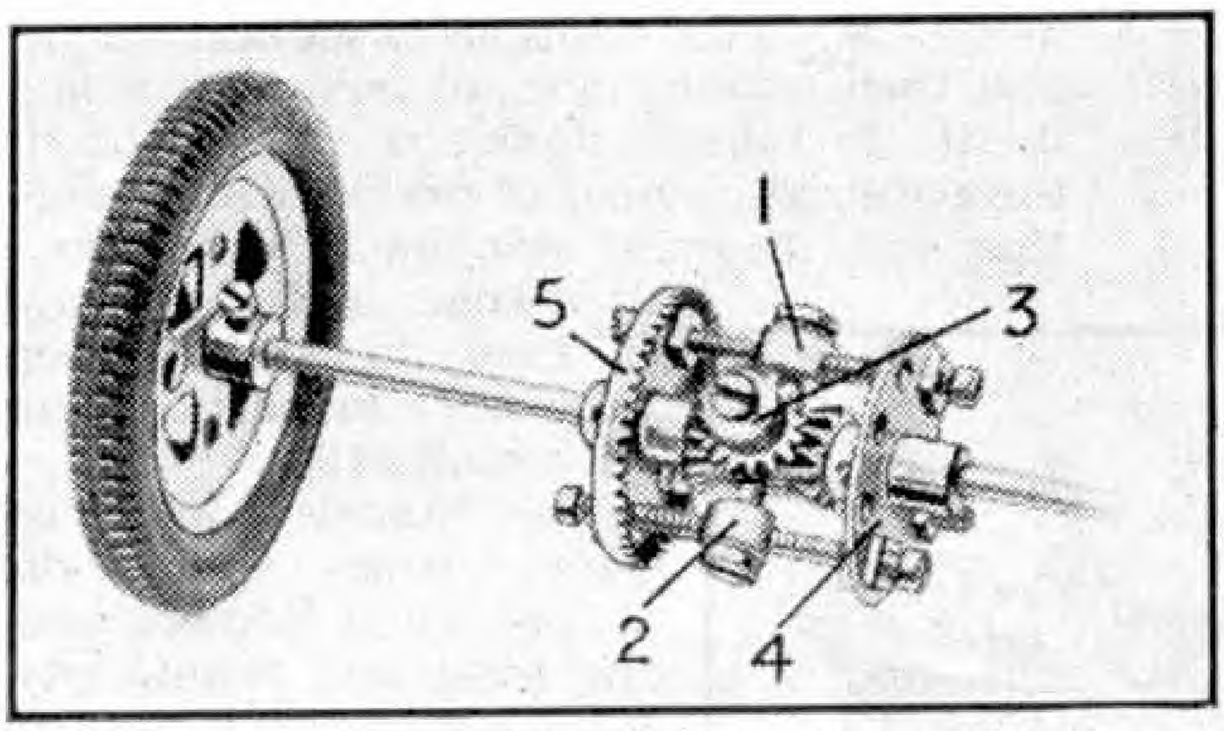


Fig. 1. A compact differential gear for small cars.

Bolts that carry Collars 1 and 2 respectively. The Pivot Bolts are screwed into the "spider" so that their screwed ends butt together and lock the parts in position. A ½" Bevel Gear 3 is fitted on a ½" Bolt also screwed into the "spider."

Nuts are screwed on the shanks of two ¾" Bolts, which are then inserted in opposite holes in a Bush Wheel 4. Then a second nut is placed on each Bolt, and they are screwed into the tapped holes of the Collars 1 and 2 to fix the latter firmly to the Pivot Bolts.

A Rod to form half of the rear axle is inserted in the boss of the Bush Wheel, and it carries a ½" Bevel Gear. The inner end of the Rod fits into the bore of the "spider." The nuts on the ¾" Bolts are tightened so that the ½" Bevel Gear meshes with the Bevel Gear 3. A 1½" Contrate Wheel 5 is attached to the Collars in a similar manner, and a ½" Bevel is then fitted on the other half of the axle. To strengthen the assembly a 2" Screwed Rod is lock-nutted to the Contrate Wheel and to the Bush Wheel.

READER'S IDEA FOR A CLOTHES HANGER

A novel application of Meccano is shown in the trousers hanger illustrated in Fig. 2. This was designed by A. M. Spooner, London S.W.2, and is intended for use with an ordinary coat hanger that is not fitted with a trousers rod. It consists mainly of two 2½" Angle Girders that form clamps. One of the Girders is fixed to the coat hanger by two 1" × 1" Angle Brackets that are bolted to its ends and screwed to the arms of the hanger. A Crank also is attached to each end of this Angle Girder, and a 2" Rod 2 gripped in its boss forms a guide for the second Angle Girder, which is free to slide along it.

P. Hancock, Edinburgh 10, a First Prize winner in a recent "M.M." Model-building Competition.

Normally the Angle Girders are held apart by a Compression Spring mounted on each Rod 2 so that the trousers ends may be placed between them. The Girders are closed together to clamp the trousers in place by pressing inward two levers 3. Angle Brackets 4 bolted to the slideable Angle Girder in the positions shown, form catches to hold the levers in position.

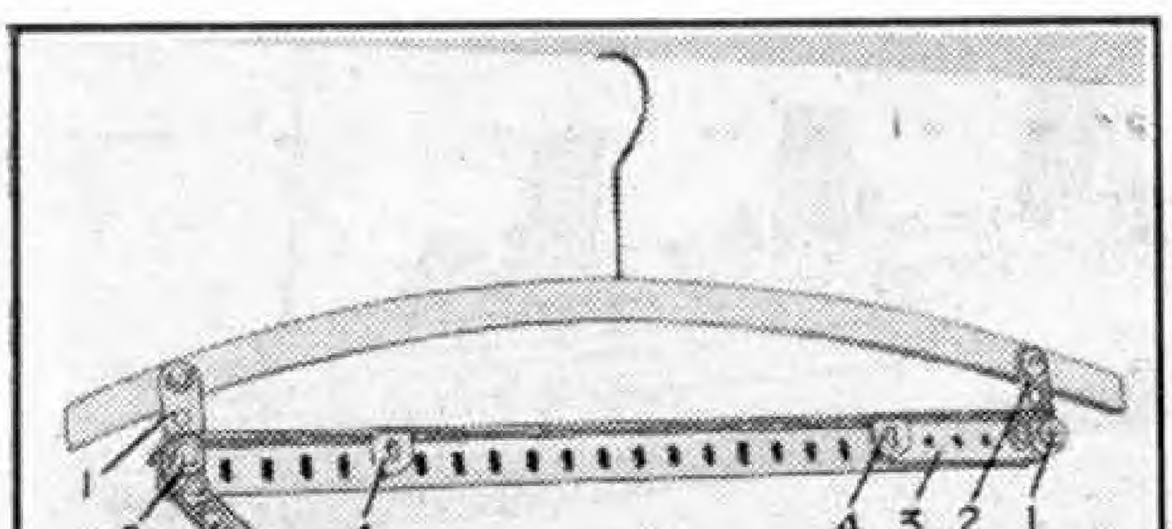


Fig. 2. A novel trousers hanger.

COMMENTS ON SUGGESTED NEW MECCANO PARTS

The adjustable bearing bracket suggested by M.

Fig. 3. Mr. Armitage's suggested adjustable bearing bracket or stud plate.

Webster, Birmingham, which was mentioned in the January issue of the "*M.M.*," aroused keen interest, and several model-builders have written to me expressing approval and in some cases offering proposals for making the suggested part even more useful. Among them is Mr. S. Armitage, Liverpool, who is an expert in devising complicated Meccano mechanisms, particularly in relation to designing machines. Mr. Armitage suggests that instead of the arm of the bracket being straight, as in Webster's original suggestion, it should be curved. It could then be used to connect a ½" Pinion and a 50-teeth Gear Wheel, the curve allowing the arm to avoid fouling the shafts on which the wheels were mounted. A similar device known as a "stud plate" is used in real engineering to carry change wheels on a screw-cutting lathe. An illustration of Mr. Armitage's improved adjustable bearing bracket is shown in Fig. 3. I think this modification effects an improvement to the original suggestion and hope it may be possible to produce something on these lines in due course.

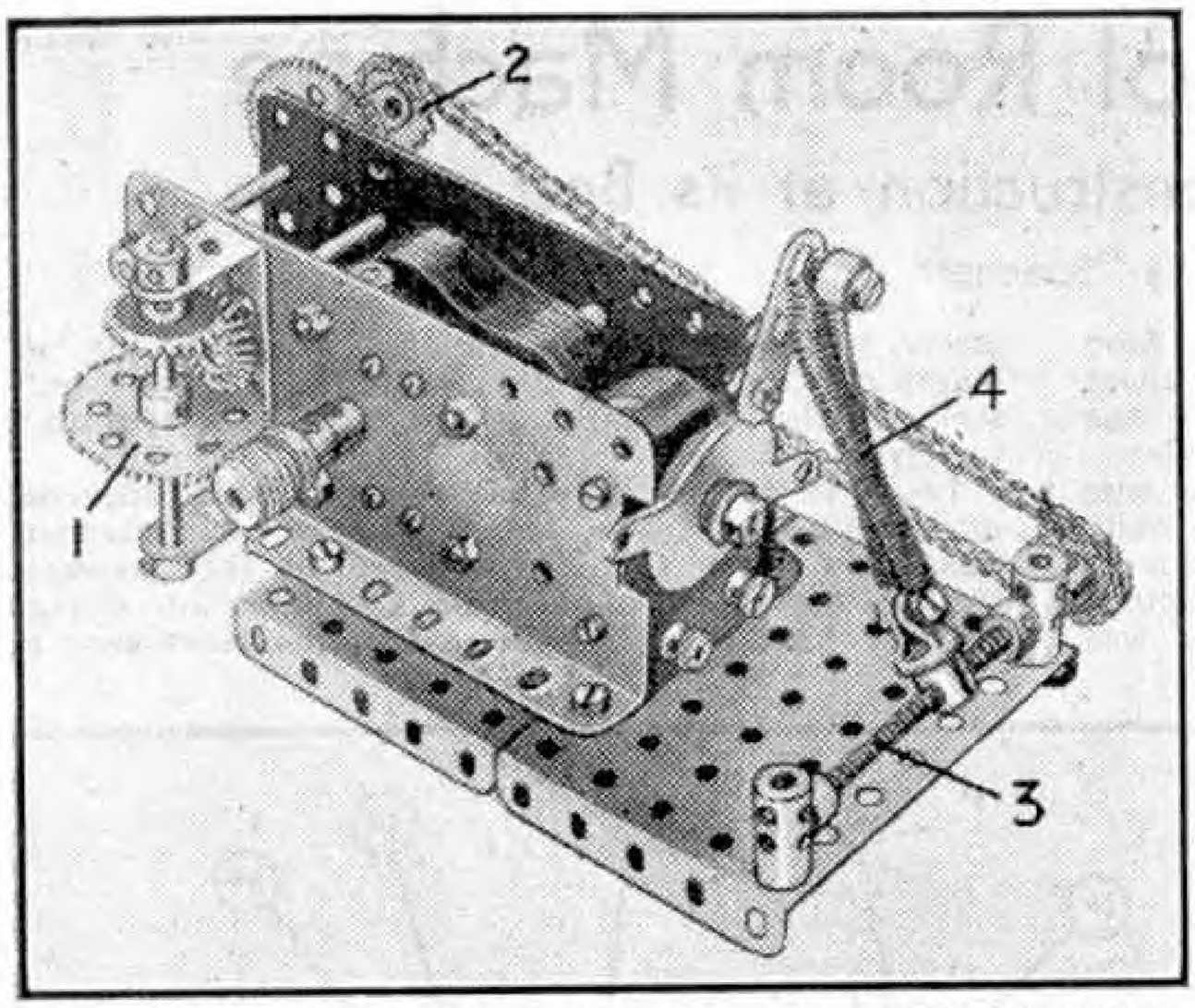


Fig. 4. Automatic reversing mechanism for an Electric Motor.

A USEFUL FITTING FOR THE E6 ELECTRIC MOTOR

Fig. 4 shows a novel type of automatic reversing movement that can be fitted to the reversing lever of a Meccano E6 Electric Motor. The mechanism was designed for use in a demonstration model of a transporter bridge that was required to operate without attention for long periods, the carriage travelling to and fro and automatically reversing at each end. The mechanism will be found useful also in other instances where a model is required to perform successive reversing operations, and another of its special features is that the period between each reversal can be adjusted as desired.

The Motor is mounted on a baseplate, and a Worm on its armature shaft engages a 57-geeth Gear 1 fixed on a 3" Rod journalled in a $2\frac{1}{2}" \times 1"$ Double Angle Strip. A $\frac{3}{8}"$ Bevel Gear on the 3" Rod engages a similar Gear on a horizontal $2\frac{1}{2}"$ Rod, which carries also a $\frac{1}{2}"$ Pinion. The $\frac{1}{2}"$ Pinion in turn drives a 57-teeth Gear on a 3" Rod, which carries also a $\frac{3}{4}"$ Sprocket Wheel 2 connected by Chain to a $\frac{3}{4}"$ Sprocket Wheel fastened on a $3\frac{1}{2}"$ Screwed Rod 3. An End Bearing on the Screwed Rod is connected by Springs 4 to a Pivot Bolt fixed to a $1\frac{1}{2}"$ Strip bolted to the reversing lever of the Motor.

When the Motor is in operation the End Bearing travels along the Screwed Rod and so extends the Springs. As the End Bearing nears the end of its travel the pull of the Springs overcomes the friction of the Motor reverse lever and it snaps over, so reversing the direction of the Motor.

FINE MODEL OF A LONDON TROLLEYBUS

The lower illustration on this page shows a neat and well-proportioned model of a London trolleybus. It was built a few years ago by Mr. N. C. Ta'Bois, Woodford Green, and has a six-wheel chassis fitted with two electric motors, both of which are remote controlled and collect their current supply from overhead wires. One of the motors is an AC/DC type and is used for driving the bus, while the other is used for steering only.

On alternating current the driving motor alone operates. This motor is wired in series with a low resistance relay, which switches on the steering motor when direct current is passed through the circuit. The direction of steering is determined by the direction of the direct current supply.

The remote control gear consists of a rheostat for varying the speed of driving and for braking, and a commutator to switch from alternating current to direct current. The rheostat also allows the direction of the direct current to be reversed.

"Overseas" Readers' Interesting Models

Many model-builders living overseas sent in entries for the "*Autumn*" Competition, which was announced in the September 1945 issue of the Magazine, and this month we are able to publish the names of the prize-winners. The full list of awards is as follows:

1st Prize, £2/2/–: R. W. Roddick, Buenos Aires; 2nd, £1/1/–: W. Swarts, Beverwyk, Holland; 3rd, 10/6: A. Procter, Ottawa, Canada.

Consolation Prizes of 5/–: P. Davy, Guildford, W. Australia; J. Norberto Escary, Buenos Aires; A. Benjamin, Germiston, S. Africa.

There was no difficulty in deciding the best model submitted. This was an outstanding example of a remote-controlled jib crane, all the movements of which can be operated from a separate control unit, placed at a distance from the model. I shall have more to say about this model in a later issue.

Second Prize was awarded to a Dutch Boy, W. Swarts, Beverwyk, who sent in a splendid model shaping machine, which is full of really interesting constructional details.

Third Prize went to Canada, and was awarded for a very simple model of a pavement snow-plough, which its builder, Alan Procter, Ottawa, says is used in the streets of his home town for cleaning the pavements after a heavy snowfall. This is a good subject for other model-builders to try out basing their designs on their own ideas. I shall be glad to hear from anyone who decides to build such a model.

A Competition Reminder

We take this opportunity to remind readers that the "*Home Gadgets Model-building Competition,*" which was announced last month, is still open for entries. The closing dates are 30th March for the Home Section and 30th July for Overseas entries.

Entries should consist of Meccano models of gadgets of any kind useful in the home.

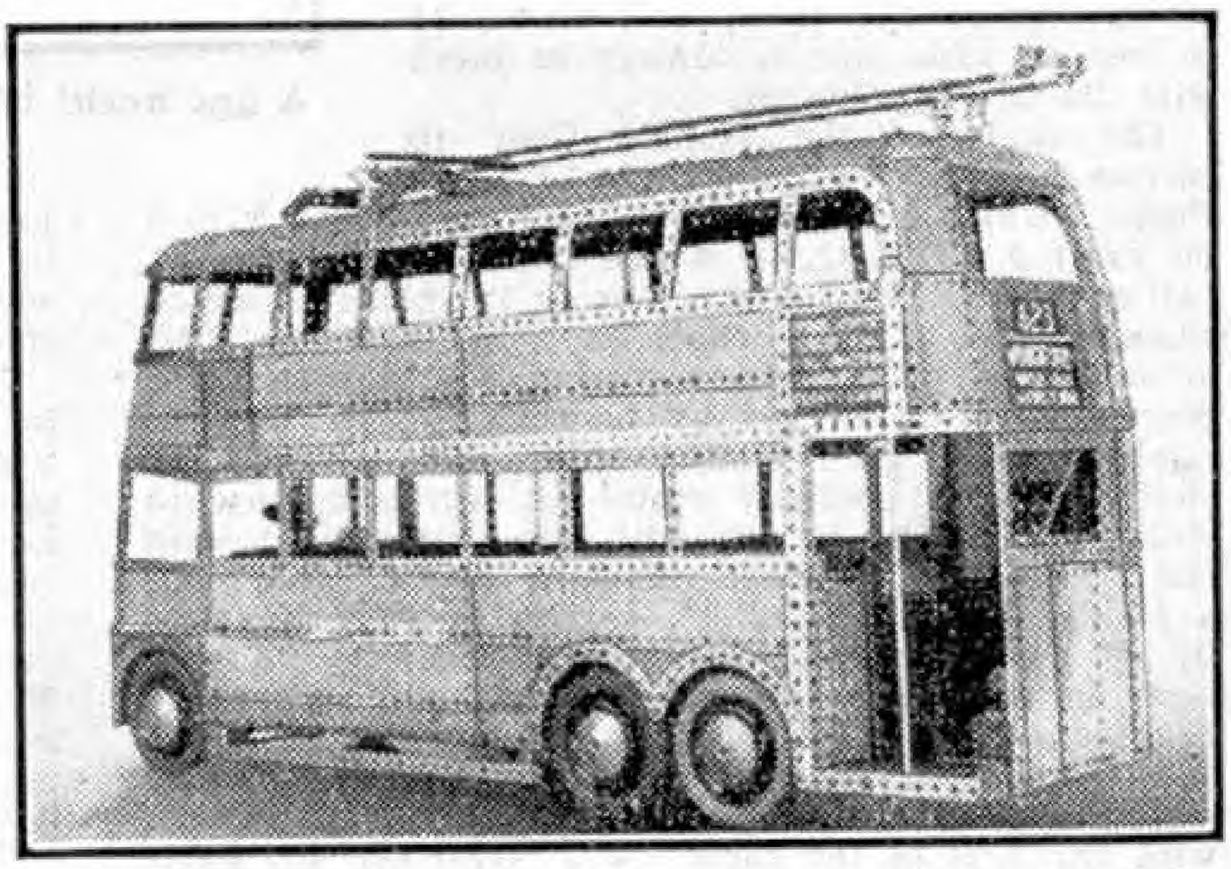


Fig. 5. This neat trolleybus is designed and arranged for remote control. It is the work of Mr. N. C. Ta'Bois, Woodford Green.

A Model Tool Room Machine

Meccano Construction at its Best

By "Spanner"

THE plant of an engineering tool or machine shop includes many machines that form excellent subjects for advanced model-builders, due to the variety of mechanical movements they incorporate. The reproduction of these mechanisms and movements in Meccano is a sure test of a model-builder's skill, and some of them will tax the ingenuity of the most experienced Meccanoites. One of the best machine tool models that I have seen for some time was brought to my notice by Mr. M. A. Reed, Woodford Green, Essex, who is the builder of the interesting model shown on this page. This is a reproduction of an automatic milling machine, which incorporates a large number of movements, all of which are fitted with self-acting feed. The model is a typical example of the real machines found in modern tool-rooms, and I recommend it as a subject for older model-builders with a good assortment of parts at their disposal.

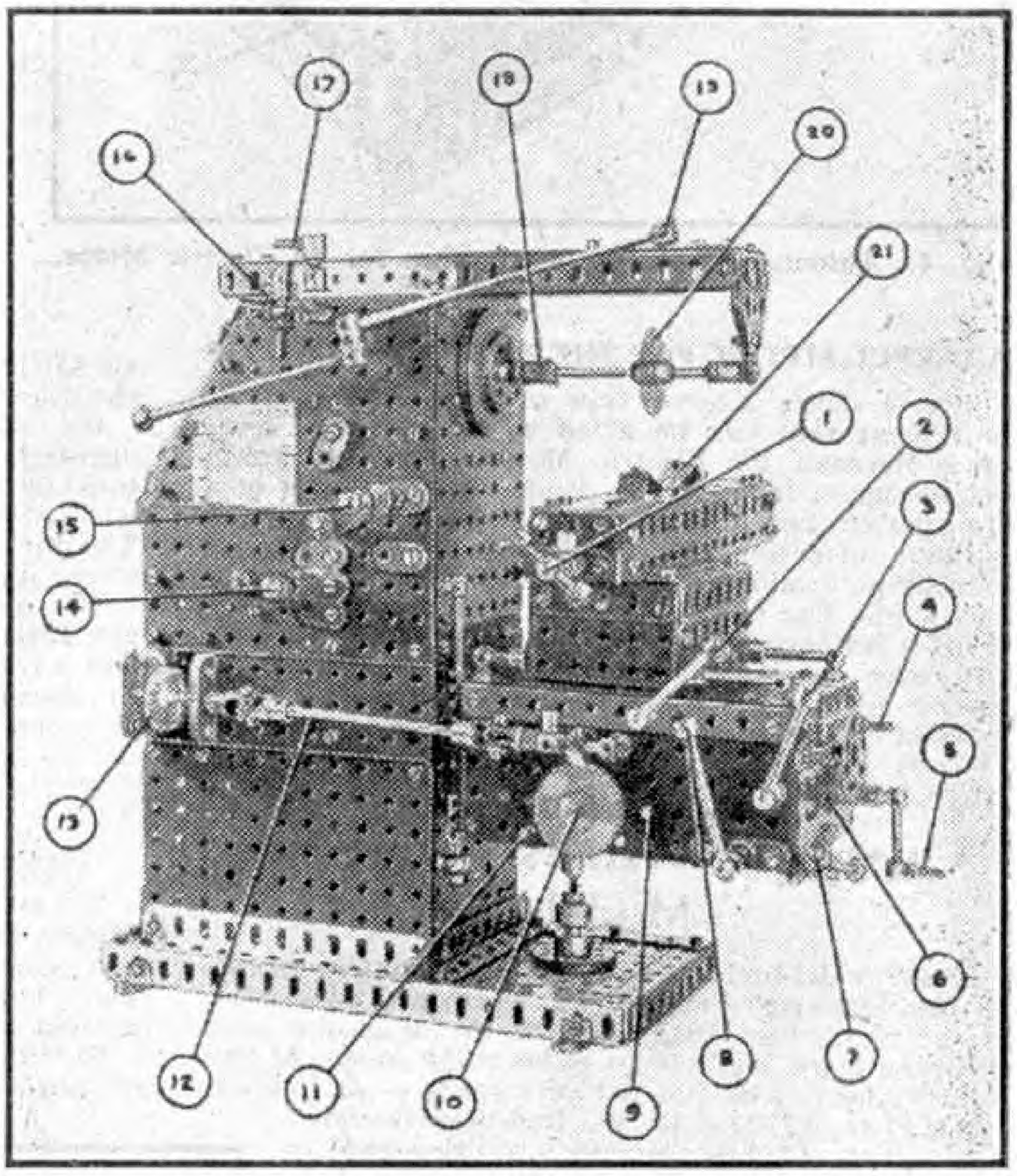
The work-table has a longitudinal movement of 2½" which is operated by handle 1, and a transverse movement of 1¼" operated by handwheel 4. The knee has a vertical movement of 1½", operated by handle 5. The work-table slide is formed by Angle Girders, and the transverse and knee slides are Axle Rods held in Handrail Supports. The slides are quite rigid and there is very little play between the column and the work table.

An Electric Motor provides the power for the feeds and the cutter. It is mounted on its side at the base of the column, and the drive is taken from it through reduction gearing and a final bevel gear to a three-speed sliding shaft gear-box, mounted horizontally in the lower part of the column. This Gear Box is controlled by handle 14. The drive from the gear-box is taken through an idler Pinion to Gear Wheel 13, and then through the flexible shaft 12 to the Helical Gear 10 on the knee. Two Universal Couplings allow for the vertical movement of the knee, and wheel 13 is free to slide but is always in mesh with its driving Pinion.

The shaft of the Helical Gear 10 carries also a ½" diameter × ½" face Pinion, which engages with a 50-teeth Gear Wheel on shaft 9. This shaft, which slides in its bearings, carries two ⅝" Bevel Gears, one or the other of which engages with a third wheel on a 2½" shaft 6. This arrangement provides a reversing gear for the feed power and is operated by lever 7.

Shaft 6 carries a ½" Pinion, and each of three sliding shafts arranged radially around it carries a 50-teeth Gear, which may be brought into engagement with the ½" Pinion. The shaft vertically above, which has a sliding movement of ¼", carries two ½" diameter by ½" face Pinions, butted together. A 57-teeth Gear in the transverse carriage engages with these Pinions over the full length of its traverse. The shaft of the 57-teeth Gear carries also a ⅝" Bevel Gear engaging with a similar Gear on a shaft parallel with the axis of the table. A 1" Gear on this shaft engages another 1" Gear on a shaft carrying two ½" diameter by ½" face Pinions, spaced ¼" apart. A further 1" Gear, lock-nutted on the work-table lead screw, engages with these Pinions throughout the full length of movement of the work table. The "self-set" feed to the work-table is brought into operation by lever 2.

Lever 3 brings into engagement the transverse movement lead screw, which runs in the threaded hole of a Strip Coupling secured to the carriage. Vertical movement of the knee is brought into operation by handle 8. The drive for this movement is taken from the shaft carrying the 50-teeth Gear to a helical gear arrangement. The 1½" diameter wheel of this Gear is mounted at the top of the lead screw which is visible beneath the knee.



A fine model of a modern machine tool built by Mr. M. A. Reed, Woodford Green.

A further three-speed gear-box is mounted vertically in the front part of the column, and is operated by a gear selector lever 15. The clutch is brought into operation by lever 19. The cutter arbor steady runs in a slide and is moved by handwheel 16 through a rack and pinion arrangement. Handle 17 serves to lock the steady arm in position. The cutter arbor carries a part of a Dog Clutch, which represents the Morse taper and driving dogs. A circular saw 20 represents a slitting cutter. Two Angle Brackets 21 are used for clamping the work to the table. Doors in the back of the column give access to the motor and gears.

The diagram plate shows the position of the gear selector levers for the various cutter and feed speeds. When the model was completed these were checked from the total gear ratios.

New Meccano Models

Drill and Swing-boat Driven by "Magic" Motor

CONSTRUCTION of the small but well-built model drilling machine shown in Fig. 1 is begun by bolting a 3" Pulley to one end of a 5½" × 2½" Flanged Plate. A 3½" Rod 1 fixed in the boss of the 3" Pulley carries at its upper end a Bush Wheel 2, to which are bolted two 2½" × 2½" Double Angle Strips. The bolts by which the Double Angle Strips are held carry also a 2½" × 2½" Flexible Plate that forms the drill table. The upper ends of the Double Angle Strips are joined by two Flat Trunnions, and between their centres is bolted a 1½" × ½" Double Angle Strip.

A 1½" Strip is fastened to the centre of the Double Angle Strip, the bolt by which the Strip is fixed carrying also an Angle Bracket. A 3½" Rod 4 forming the drilling shaft is journalled in the end hole of the 1½" Strip, and also in the hole at the narrow end of one Flat Trunnion. The shaft carries two 1" Pulleys, one above the Flat Trunnion and one below it. An Angle Bracket fastened to the lever 5 bears against the lower 1" Pulley so that the height of the drill can be adjusted by moving the lever up and down. The lever is a 3" Strip lock-nutted at its inner end to the Angle Bracket held by the bolt that carries the 1½" Strip supporting Rod 4.

The 2" Rod 3 is journalled in a Double Bracket, and it carries a 1" fast Pulley and a 1" loose Pulley. The loose Pulley is positioned on the Rod by a Spring Clip.

Bearings for the 3" Rod 6 are provided by a Stepped Bent Strip bolted to Bush Wheel 2, and on it are fixed a 1" Pulley and a 3" Pulley. The 1" Pulley is connected to the upper Pulley on the driving shaft by a belt of Cord, which passes also over the two 1" Pulleys on Rod 3. The 3" Pulley on Rod 6 is driven by a Driving Band from the Pulley of the *Magic* Motor, which is bolted to the rear of the Flanged Plate that forms the base.

Parts required to build the model Drilling Machine: 1 of No. 5; 1 of No. 6a; 1 of No. 10; 2 of No. 12; 2 of No. 16; 2 of No. 17; 2 of No. 19b; 2 of No. 22; 1 of No. 22a; 1 of No. 24; 16 of No. 37; 1 of No. 37a; 1 of No. 44; 1 of No. 48; 2 of No. 48a; 1 of No. 52; 2 of No. 126a; 1 of No. 190; 1 *Magic* Motor.

The model swing-boat shown in Fig. 2, also is operated by a *Magic* Motor and is particularly attractive when set in motion. Its construction is begun by bolting two Trunnions to the 5½" × 2½" Flanged Plate that forms the base. The uprights are 12½" Strips, braced at the bottom by Semi-Circular Plates and connected at their upper ends by two 2½" Strips and Angle Brackets. Two 1 11/16" radius Curved Plates complete this part of the assembly.

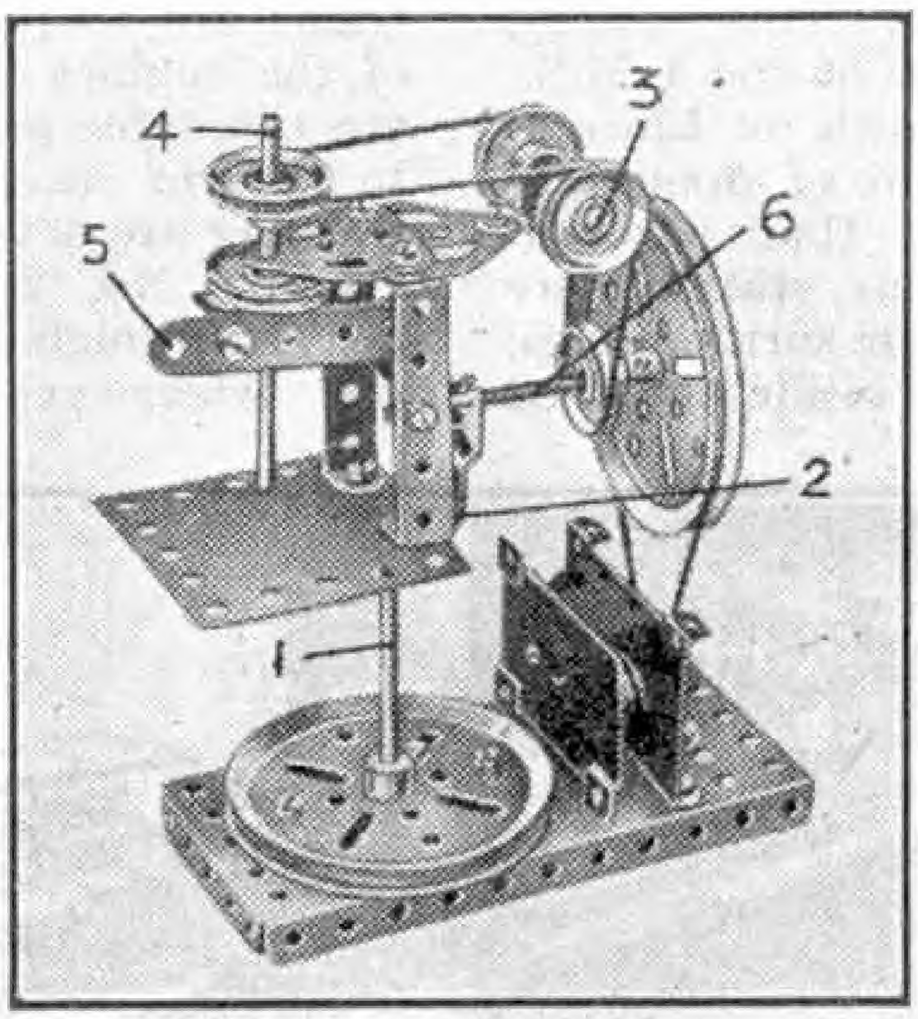


Fig. 1. A model drilling machine driven by a "Magic" Motor.

Each side of the swing boat consists of two 2½" Strips connected by a 2½" Curved Strip, the same bolts holding also a 2½" × 1½" Flexible Plate. A 5½" Strip is bolted to the upper edge of the latter part. The sides of the boat are connected by two Double Angle Strips and by two 4½" × 2½" Flexible Plates and Angle Brackets, and the ends are formed by U-Section Curved Plates. The body of the figure in the boat consists of two Flat Trunnions to which two 2½" Curved Strips are pivoted to form its arms. The lower Flat Trunnion is attached to the swing-boat by a Double Bracket.

Pairs of 5½" Strips overlapped three holes connect the boat to a 4" Rod journalled in the uprights, and one of the Strips is bolted to a Bush Wheel fixed to the Rod. A 2" Rod is passed through the end holes in the arms of the figure, and this is connected by Cord to a 3" Formed Slotted Strip bolted to the Curved Plates.

The *Magic* Motor 4 that operates the model is bolted to the left-hand Semi-Circular Plate. It drives a 1" Pulley 3 fixed on a 1½" Rod, bearings for the latter being provided by one of the uprights and a Reversed Angle Bracket. An Angle Bracket is fixed to the boss of the Pulley and is pivotally connected to the 2½" Strip 2 in the manner shown. Strip 2 is bolted to a Reversed Angle Bracket, which in turn is fixed to the boss of Pulley 1. The position of the Pulley 1 should be adjusted so that when Pulley 3 rocks lever 2, the boat swings through an equal distance on each side of the uprights.

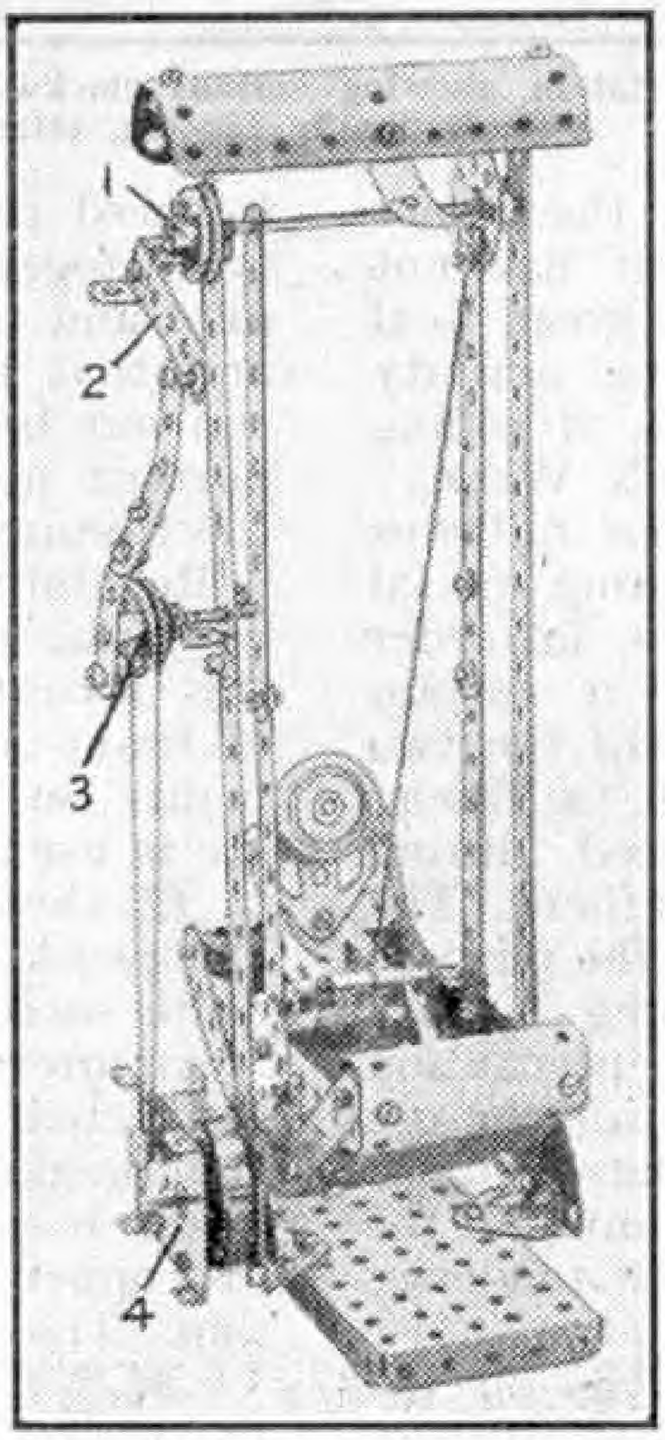


Fig. 2. Lots of fun can be had from this swing-boat, driven by a "Magic" Motor.

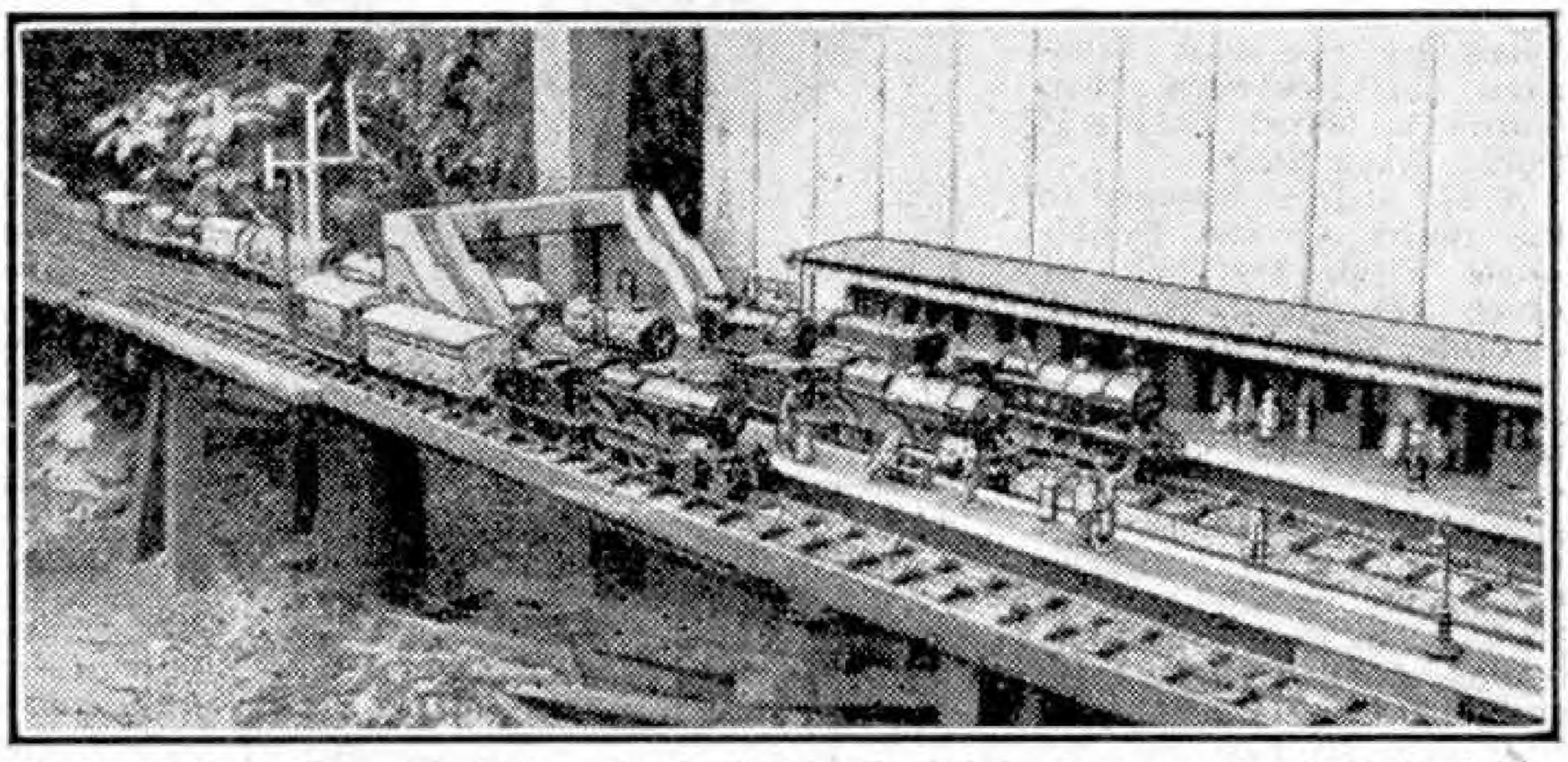
Parts required to build model Swing Boat: 2 of No. 1; 6 of No. 2; 9 of No. 5; 1 of No. 10; 1 of No. 11; 9 of No. 12; 1 of No. 15b; 1 of No. 16; 1 of No. 17; 1 of No. 18a; 3 of No. 22; 1 of No. 24; 5 of No. 35; 56 of No. 37a; 50 of No. 37b; 6 of No. 38; 1 of No. 40; 2 of No. 48a; 1 of No. 52; 4 of No. 90a; 6 of No. 111c; 2 of No. 125; 2 of No. 126; 2 of No. 126a; 1 of No. 155a; 1 of No. 176; 2 of No. 187; 2 of No. 191; 2 of No. 199; 2 of No. 200; 2 of No. 214; 1 of No. 215; 2 of No. 127a; 1 *Magic* Motor.

News from an Outdoor Layout

The "*Bincliff, Lakeside and Shedley Railway*"

MOST readers will recall the Gauge 0 "*Bincliff, Lakeside and Shedley Railway*" that has been referred to in these pages from time to time. This system, which represents a section of the L.M.S., is owned by Mr. C. B. Smith, of Lincoln. The railway is situated out of doors and is of special interest on that account. The names of the various stations are suggestive of their immediate surroundings; for instance, "*Shedley*" is inside the shed in which most of the work connected with the railway is done.

All-the-year-round operation is characteristic of this line and the track has been in use for several years. It consists of small scale permanent way, the maintenance of which is an important item in keeping the track constantly fit for the trains to use.



"Lakeside" station, showing various clockwork locomotives on the layout of Mr. C. B. Smith, Lincoln, referred to on this page.

Recent notes received from the owner indicate that the layout itself has not been extended or changed a great deal lately, but there has been some activity in the provision of new items of rolling stock, built in the "Company's Works." The chief enemy of all outdoor railways is the weather and two interesting special vehicles have been developed in order to counteract its effects to a certain extent. The more spectacular of the two probably is the snow plough, a robust appliance that has been used during several spells of severe weather. The other is a tank wagon built for the purpose of oiling the track after running is over, or at any time when this precaution seems necessary. With steel rails in use the effects of the weather have to be taken into account, and the running of the track-oiling vehicle reduces the tendency to rusting.

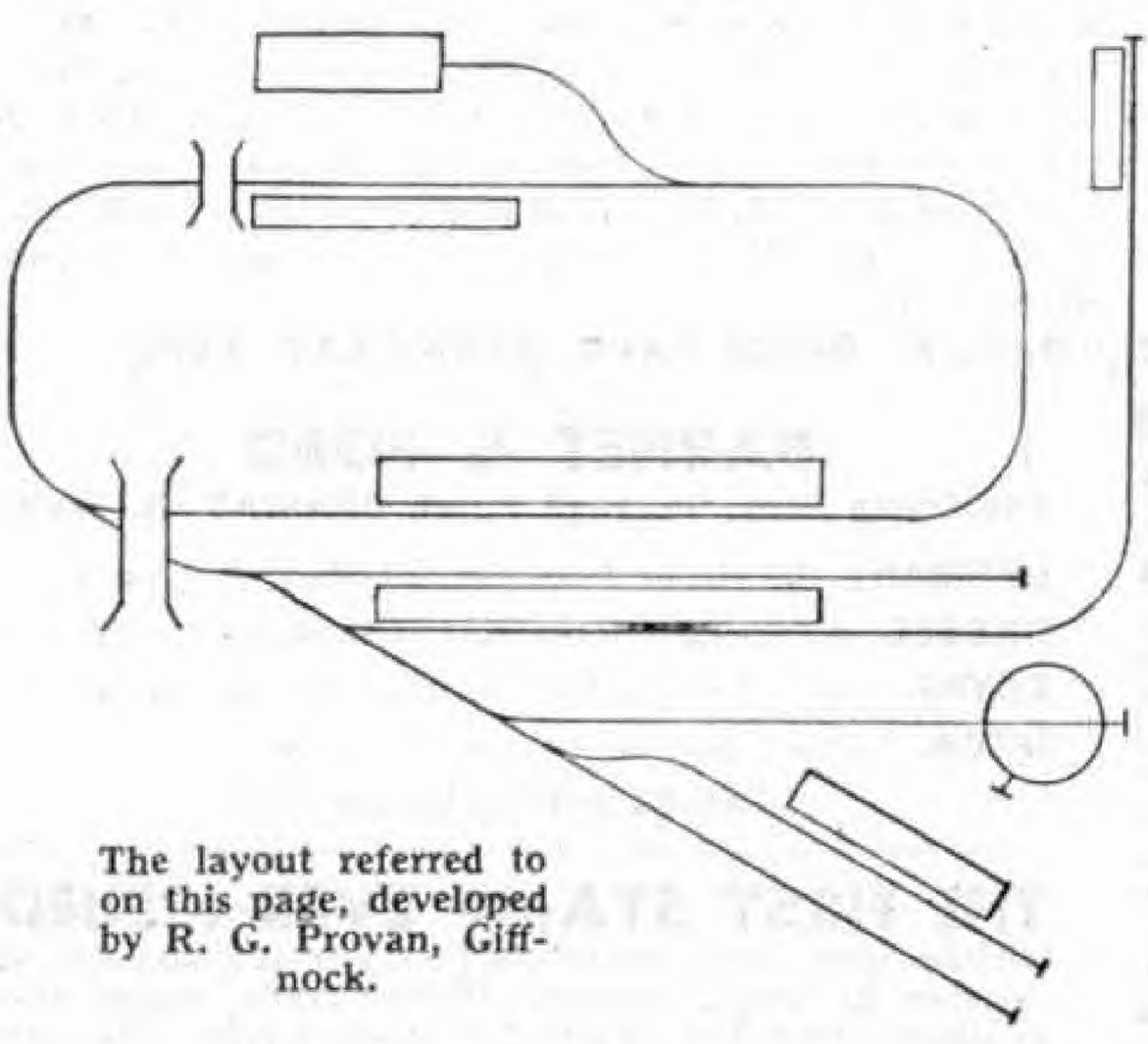
Practically all the locomotives on the line are clockwork, and their performance in general is very satisfactory. The long stretches of straight track available as compared with what is possible on indoor railways are of considerable advantage. At the same time loads are heavy and trains are frequent, so that maintenance of the engines is of special importance if the timetable programme is to be adhered to. Firm favourites for long-distance working are several 4-4-0s of the familiar Hornby No. 2 Special type. At times heavy through trains are double-headed, and whenever possible the practice is followed of using two engines of similar type together. This ensures that both pilot and train engine will keep "in step," and that the clockwork of one will not run out before the other. This is an important point that is often neglected in the running of clockwork railways.

Reliability is the strong point of clockwork locomotives, and their control on this layout is assisted by the provision of brake and reversing trips at strategic points on the track. Steam locomotives are in use as well, but it is a little difficult to fit these into a roster of duties with clockwork engines, although they are quite successful in working.

An interesting piece of special equipment connected with the locomotive depot is the breakdown train. This includes the usual heavy-duty crane, a match truck or runner wagon and a tool and riding van. The latter is prominently lettered "*L.M.S. Loco. Dept. Shedley.*" Its inclusion completes an unusual train and adds considerably to the "professional" air of the breakdown unit as a whole.

A Hornby Layout with Special Features

OWNERS of Hornby layouts normally base their train operations on those of a full size railway in their own district. It is natural to find, therefore, that the railway shown in the diagram on this page, which is situated in a suburb of Glasgow, should follow in some respects the characteristics of one of the Scottish routes. It has in fact something of an atmosphere of the West Highland line of the L.N.E.R., which of course has its origin in Glasgow, although its lonely road to the Western Isles does not begin in earnest until Craigendoran is reached.



The layout referred to on this page, developed by R. G. Provan, Giffnock.

The line has been developed by Hornby Railway Company members, the prime mover in its construction being R. G. Provan, former Secretary of the Giffnock H.R.C. Branch No. 474. The layout has many interesting features in spite of its generally simple character. In this respect it resembles the West Highland route. The main line is a continuous oval and consists of single track, although at the principal station, appropriately named "*Glen Arkney*," there are additional roads for various purposes.

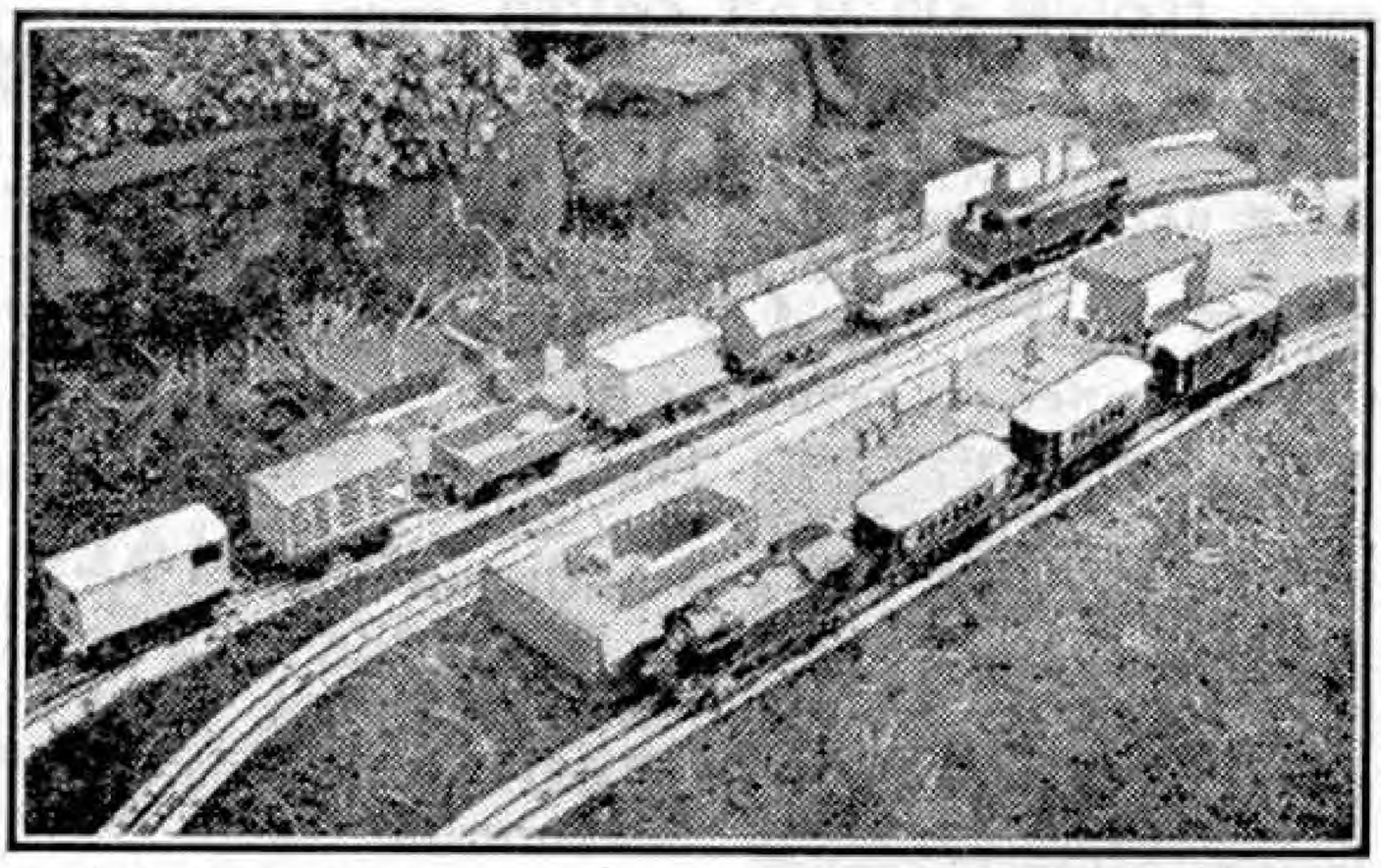
Taking the diagram as it stands on this page, the line may be said to start in the upper right-hand corner, where a small station known as "*Rannoch*" is situated. A short distance away from the platform a rock-face cutting is encountered, and the track then soon swings round to enter "*Glen Arkney*" station, where platform 3 serves the branch line. The main track is joined beyond the further end of the platform, various sidings in addition to the main and branch lines converging more or less at this point. Proceeding in an anti-clockwise direction the line reaches "*Fort Valery*," a small but important station where there is an engine shed that serves the whole line. Then on again, and running alongside the "*Rannoch*" branch for some distance, the main track finally turns to reach "*Glen Arkney*" once more, this time at platform 1.

A dead-end road runs parallel to the through main line here, giving the appearance of double track through the platforms. Actually the dead-end road serves No. 2 face of the island platform line that lies between it and "*Rannoch*" branch, the main platform being that alongside the through line. A footbridge connects the two platforms. With through traffic, branch line connections, the goods yard and depot shown in the diagram, together with the turntable, the whole station has an air of quite busy importance. If it had been possible to convert the dead-end or centre platform line into a loop, things could have been made more interesting still. A loop line would make it possible for up and down trains to "cross" one another, each one running in turn round the single track main line while the other waits at the station. This would represent working typical of the passing places of the West Highland and other similar lines.

On a layout of this kind stations have to change their identity as a train makes successive circuits of the track, but this is a phase of miniature railway operating that is familiar to most readers. Thus the branch line train of two No. 1 Coaches and a Guard's Van will start from "*Rannoch*" in charge, preferably, of one of the several 0-4-0 locomotives that are in service on the layout. The train makes its way on to the main line, where several circuits can be covered with stops at one or other of the stations as required. It can then come to rest alongside the main platform at "*Glen Arkney*" where supposedly passengers "change for Glasgow and the south." A main line train can be waiting on the centre road ready for the journey south. The engine of the local train can be detached and run to the turntable for turning; or it can if necessary simply run round the track to the other end of the train, which can then be worked back to its starting point. The long-distance train can then leave, making its run with various stops until final arrival at "*Glasgow*," or whatever point is called for in the working arrangements. Many interesting variations are in fact possible on the layout according to the time and equipment available for operations.

The situation of the engine shed may seem a little unusual. It is, but it avoids the crowding of most of the interesting features into only one "hot spot" that would have occurred if the shed had been placed at "*Glen Arkney*." Trains may require assistance over a part of the journey and a pilot engine can be easily attached or detached at "*Fort Valery*."

Engines in use include a Hornby No. 2 Special Tank and there are several of the smaller 0-4-0s.



An interesting station served by several roads. The platforms were built of Meccano parts by A. H. Ellis, Birmingham.

For other Stamp Advertisements see also pages 124 and vii.

Stamp Collecting

Warship Pictures on Stamps

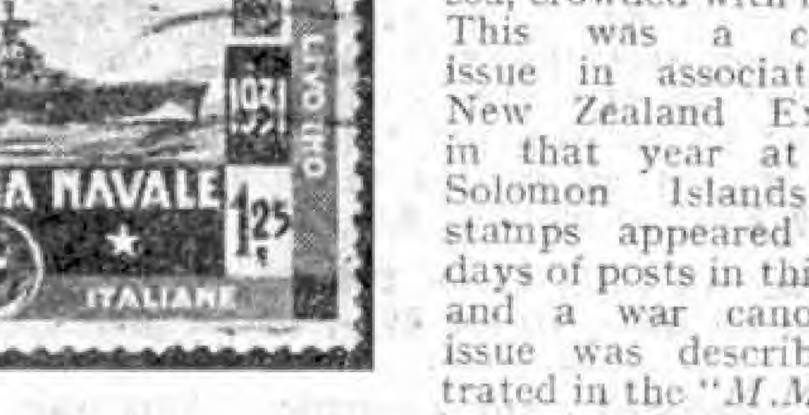
By F. Riley, B.Sc.

IT is not surprising to find that ship stamps are very numerous, for a ship, whether it be a modern liner or an old time sailing vessel, lends itself readily to the production of very attractive designs, and even a native canoe makes an excellent pictorial. The wealth of ship stamps indeed is so abounding that it is impossible to deal with the subject in the space of a single article. In the present one I propose to deal only with naval vessels, leaving merchant vessels to further articles in later months.

It is perhaps only natural to look first for stamps that picture British warships, but these are very few in number, and none of them is British. This is due to the reluctance of the British Post Office to issue pictorials or commemoratives. The only famous British ship that does appear as the principal feature of a stamp design is Nelson's "*Victory*," and for this we have to go to the stamps of Antigua, a British colony in the West Indies.

There are other British warships to be seen on stamps, but in no case does the ship itself really form the central feature of the design. One such example is the Papua 2d. of 1934 illustrated in the "*M.M.*" for September last. This stamp is one of a series issued to commemorate the Jubilee of the declaration of British Protectorate over Papua, and shows a scene on the deck of H.M.S. "*Nelson*" in 1844 when the Protectorate was proclaimed. Another example of a kind comes from Greece. This is a stamp issued in 1927 to celebrate the centenary of the battle of Navarino, in which a Turkish fleet was overwhelmingly defeated by an Allied fleet including British warships. The picture on the stamp shows the battle, and one of the ships depicted may be British.

It is curious that the United States has not turned to warships for stamp designs, especially now that the country has such a magnificent fleet. Admirals have figured on four U.S. stamps, in a set issued in 1936–37 to celebrate army and navy heroes. The admirals have been rather crowded on these stamps, three of which portray two each while a fourth actually carries three portraits. One of these features John Paul Jones and Barry, sea fighters of revolutionary days. Jones fought the famous action against the "*Serapis*" off Flamborough, one of the most desperate sea actions on record. The others have portraits of Decatur and MacDonough, famous American captains of the war of 1912, and Farragut and Porter, naval heroes of the Civil War. Room has been found on all these stamps for naval vessels of the period at which these admirals commanded, and these seem to be the only examples of warships on the stamps of the United States.



The fourth value celebrated the Spanish-American War Admirals Sampson and Schley, and Dewey, the hero of the fight with the Spanish fleet in Manilla Bay. This fight took place in the ironclad era, but no pictures of such modern vessels appear on the stamp itself, which is not surprising in view of the fact that it carries three portraits. A Philippine Islands stamp of 1935 however features the battle itself, and on it ironclads are seen in action.

There is a better choice of war vessels when we turn to colonial and foreign issues. War canoes give us an excellent start, and we can find these on stamps of the Solomon Islands and New Zealand. Of the New Zealand examples the 1d. value of 1906 is the best, for it presents a splendid picture of a canoe at sea, crowded with native warriors. This was a commemorative issue in association with the New Zealand Exhibition held in that year at Christchurch. Solomon Islands war canoe stamps appeared in the early days of posts in this Protectorate, and a war canoe in a later issue was described and illustrated in the "*M.M.*" for October last. Another example of a war canoe comes from Cook Islands, on the 2d. stamp of the issue of 1932, the canoe this time being a double one.

There are several examples of famous sea battles on stamps, including a 17th century combat on a Dutch stamp of 1907, issued to commemorate the 300th anniversary of the birth of de Ruyter, the most famous of all Dutch sea commanders. Besides giving a portrait of de Ruyter the stamp illustrates a crowded sea battle, with sailing ships of the period close together firing their guns with real gusto, judging by the clouds of smoke billowing away from them. Other examples of fights of this kind come from Chile in South America, a country that as long ago as 1910 depicted fights between sailing vessels that occurred when that country was struggling for independence 100 years earlier.

For modern naval vessels we have to turn to Italy, Rumania, Russia, Turkey and Japan. Italian examples include a naval motor launch, a training ship and a cruiser. Rumania rather surprisingly shows a series of stamps illustrating naval vessels, including a cadet ship, various cruisers, a monitor and even a submarine. Russia has been satisfied with a cruiser, as has Turkey; for the larger battleships we have only Japanese examples.

For other Stamp Advertisements see also pages 122 and vii.

Stamp Gossip

and Notes on New Issues

By F. E. Metcalfe

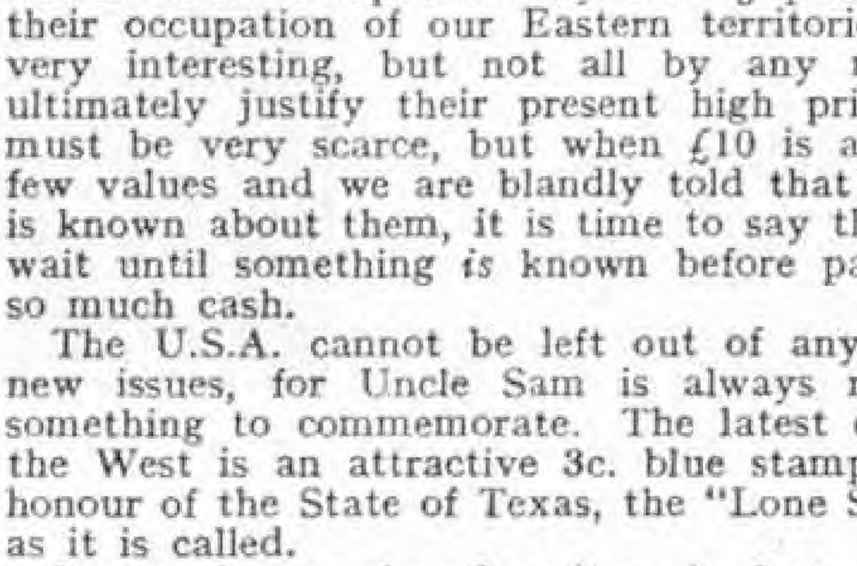
IN spite of the flood of new stamps which foreign countries continue to turn out, stamps of our own Empire continue to engage most of the attention of British collectors. As time goes on, and when these foreign issues have reached saturation point as far as collectors' capacity to take them up is concerned, then we are all going to echo that well-known advertisement: "How right we were to collect British stamps."

And what about British colonial stamps this month? Well, few sets have received a greater slating than the New Constitution set of Jamaica. It's a poor set all right, but in the long run collectors forget these things and just buy, when they are collecting the particular country to which the stamps belong. And Jamaica is popular enough, which is the reason why the writer made the much critised set his "tip" for the month in October last, when it was seen that collectors were for the time being holding off buying.

Three of the stamps have already appeared in two perforation varieties, and as there is more than a slight chance that other values will follow suit, the sooner collectors who have not bought do so, the less they are likely to have to pay. Already the 4½d. stamp perforated 12½ is proving a good item, and the 2d. value in the same perforation is well worth picking up at two or three times its face value.

Victory stamps are very popular at the moment, and those of India enjoy a vogue like the rest, but one cannot claim for them any high artistic merit. The "Victory" stamps of South Africa have had a bad press also, but surely these cannot be considered too bad, and at any rate, when they want new stamps in South Africa they get cracking, and don't footle about with competitions for designs, etc., which after all result in efforts such as we have seen from Jamaica.

Collectors who owned 1939 sets of North Borneo were always rather afraid that one day the market would be flooded by sets said to be in the hands of the authorities. That danger, if it ever existed, has passed, for the stamps in question have been overprinted "B.M.A." as in the case of Straits Settlements, and by the time these words appear in print collectors at home will no doubt be able to get their sets from most dealers. Don't wait. Some of these stamps are going to be very good. The green and red 5 dollar Straits Settlements could be bought for less than a pound for a week or two after first supplies arrived in this country. It is not yet quite certain how many were actually overprinted "B.M.A.," but by all calculations the number must have been small, and there may come a day when this stamp will sell for as much as £20.



On the other hand, all those Malayan stamps which were overprinted by the Japanese during their occupation of our Eastern territories, may be very interesting, but not all by any means will ultimately justify their present high prices. Some must be very scarce, but when £10 is asked for a few values and we are blandly told that very little is known about them, it is time to say that we will wait until something *is* known before parting with so much cash.

The U.S.A. cannot be left out of any record of new issues, for Uncle Sam is always ready with something to commemorate. The latest effort from the West is an attractive 3c. blue stamp issued in honour of the State of Texas, the "Lone Star State" as it is called.

Egypt of course has done it again, but quite unlike America it has again done it wrongly. The U.S.A. takes a more or less worthy object for its subject, and generally emits an attractive stamp of low face value, which is on tap for all. In contrast Egypt issues restricted quantities, and if rumour is at all correct, and there is generally plenty of evidence about to show that it is, even the restricted quantities are sold by under-the-counter methods. Many collectors at home simply collect Egyptian stamps because they are listed in Gibbons' Part I. They have no right to be there, and Gibbons are doing nobody at home any service by keeping them there.

By the time these words appear the new set for the Falkland Island Dependencies will be out. This will be a very popular set, for its face value is modest, the top value being 1/–. The design incorporates a map, always an attraction, and it is for postal duty in the romantic Antarctic. We will illustrate one of the stamps next month; in the meanwhile one can expect more protests from Argentina, which also has claims in the part of the world covered by the stamps. As a matter of fact, probably the real reason why these stamps were issued at all was to stake our own claim. Maybe one day they will be used in evidence in our support. It wouldn't be the first time that postage stamps were used thus.

The "tip" this month must be the 4½d. value of the Jamaica "constitution" set, Perf. 12½. It is going to be a good little stamp.

From Our Readers

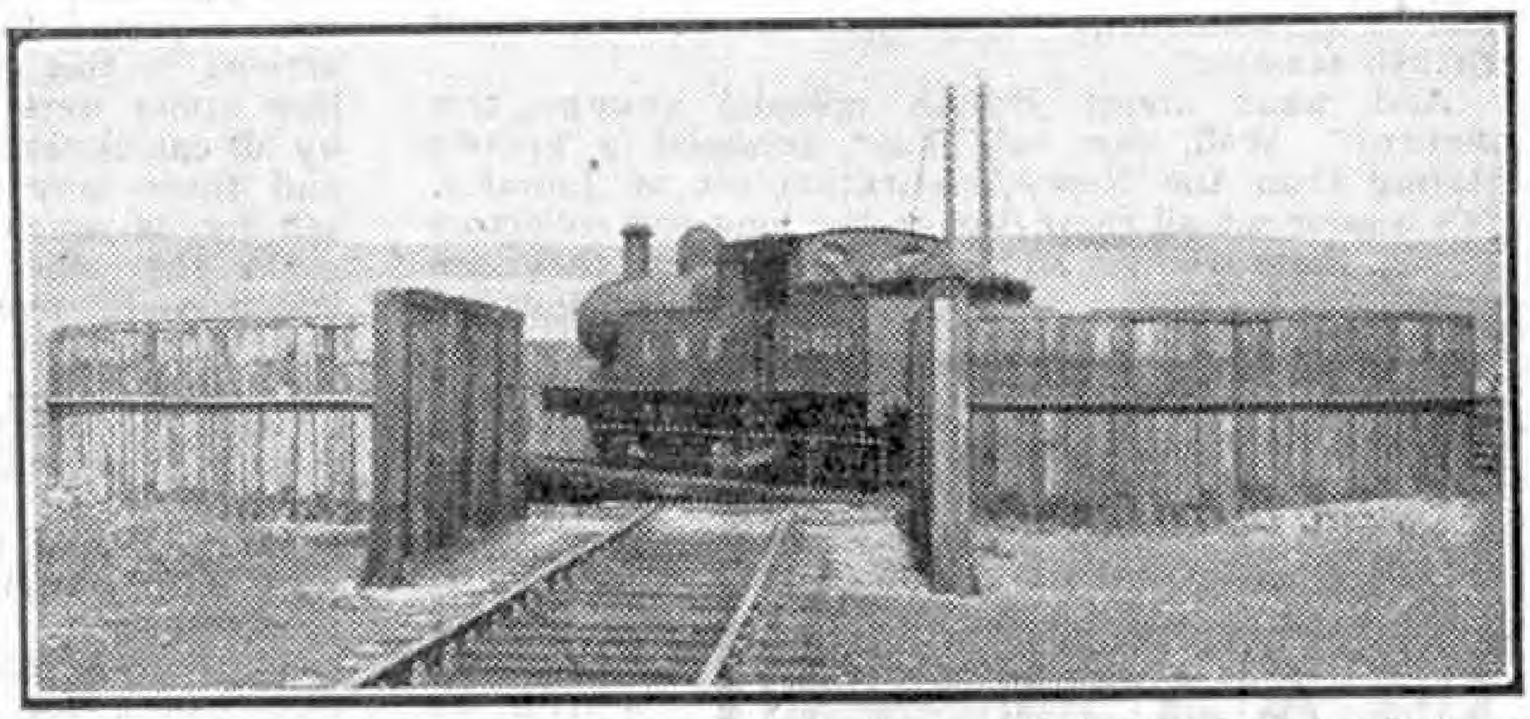
This page is reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of which the writer has special knowledge or experience. These should be written neatly on one side of the paper only, and should be accompanied if possible by original photographs for use as illustrations. Articles published will be paid for. Statements in articles submitted are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

A NON-STOP TURNTABLE

The little station of Garsdale, on the Settle and Carlisle line of the L.M.S., has several claims to fame. It is situated high among the Pennines, at a height of over 1,100 ft. above sea level, and is the highest main line station in England. In a bleak and lonely spot such as this, it is not surprising that during a gale the wind reaches a very high velocity. On one such occasion, many years ago, when an engine was being turned, the wind blew the turntable round and round, to the consternation of the railway staff. To prevent a recurrence of this, a palisade was built round the turntable and still remains there, as can be seen in the accompanying illustration.

Another unusual feature is a small library of about 200 books, in one of the waiting rooms of the station. This was presented for the benefit of the railway staff, who live far from the amenities of civilisation.

W. S. GARTH (Preston).



The turntable at Garsdale, L.M.S., which is protected from the wind by a palisade. Photograph by W. S. Garth, Preston.

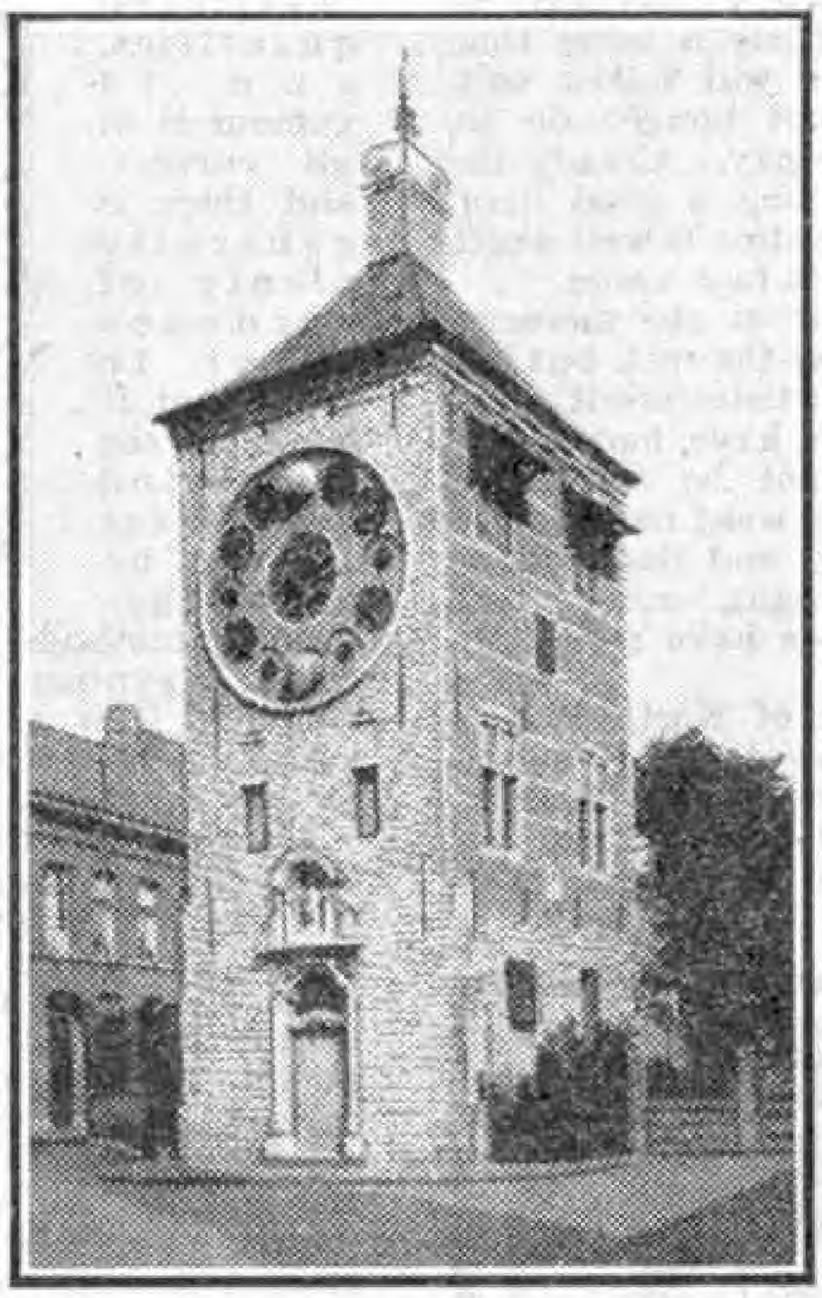
A WONDERFUL BELGIAN CLOCK

The "Zimmer Tower" at Liers in Belgium, shown in the lower illustration on this page, was built in 1930 with its centenary clock in commemoration of Belgium's 100 years of independence, and in 1931 an astronomical studio was built inside the tower.

The centenary clock has 13 dials, the 13th of which is an ordinary clock dial showing Greenwich mean time, which was adopted in Belgium for all time-keeping purposes in 1892. Other dials show the day of the week, the month and the calendar date, while the Moon's phases, the tides and the seasons are also indicated, together with the signs of the Zodiac and other astronomical features.

It is interesting to note that Mr. Zimmer, who both built the centenary clock and constructed the astronomical studio, is still living in Liers. He has made other famous clocks which are on semi-permanent loan to America and are at present housed in New York. He also made three special clocks in 1944, and presented one each to Marshal Stalin, the late President Roosevelt and Mr. Churchill in token of Belgium's gratitude for liberation.

E. KENDALL (B.A.O.R.).



A remarkable clock tower with 13 dials. It was built at Liers, Belgium, in 1930 in celebration of 100 years of Belgian independence.

AN UNUSUAL MUSEUM

While on a holiday at Worthing I paid a visit to Bramber, a quaint little village about 10 miles north of the town, to visit Potter's Museum. This is a hut about 30 ft. long and 20 ft. high, and is most remarkable for its stuffed animals.

William Potter, the creator of this Museum, lived and died in the village. His great interest was in animals and birds. At the age of 15 he conceived the idea of making a model of the death and burial of Cock Robin. He stuffed the birds for this himself, and the task occupied him seven years. The only items in it that he made from other materials were the trees and other scenic features, and a cow, about 4 in. high, which, true to the story, pulled the rope of the church bell. Every detail imaginable is put in, including a dab of glue as a tear on the face of one of the bird onlookers, which is using its claw in an effort to wipe the tear away. This scene was exhibited in the garden of the hotel in Bramber. Later, with other exhibits it was moved to its present position.

Then Potter decided to make other cases of great interest, and on going round the Museum I saw all these. There are the two representing clubs named respectively "The Lower Five" and "The Upper Ten." In the former there are 12 stuffed rats, all assuming some very human attitude. For example one of them, apparently in a drunken sleep, has a pipe almost falling out of its mouth, while a police "rat" looks round the door to see that the occupants are behaving themselves. In the better class club 21 stuffed red squirrels are seated, some drinking, some playing cards. Other groups include a cats' wedding, a kittens' garden croquet party, and a guinea-pigs' cricket match. There are also stuffed freaks, such as a chicken with four legs, and many other curiosities in the Museum.

ALAN EDMONDS (Harrow).

Competitions! Open To All Readers

A Novel Crossword

CLUES ACROSS

1. Statue.
3. Essential.
6. Zinc.
9. Part of a circle.
10. Before.
11. Creek.
14. Teacher.
16. Used for rowing.
17. Vase.
18. Teach.
21. Young person.
22. Precise.

CLUES DOWN

1. Perfect type.
2. Opening.
4. Wrath.
5. Tag.
6. Monarch's staff.
7. Decree.
8. Suite.
12. Grub.
13. Sweet fluid.
15. Muzzle.
19. Spot.
20. Paid to Government.

This month we have a crossword for our readers, and a hasty glance at the diagram might suggest that the crossword has already been solved! This is far from the case, however, for it is a code crossword that we are placing before readers. Clues are given as usual. These lead to the correct solution, and the idea is to work out the code that has been used in compiling the diagram. This novel crossword is the work of an "*M.M.*" reader, T. K. Chaplin.

An example or two will make this clear. The clue for 1 across is "Statue," and an obvious solution in five letters is "Image." This means that the solution to 1 down, which according to the clue must be "A perfect type," must also begin with the letter I, and this leads to the solution "Ideal." Thus we have seven letters in the code that is to form the solution. The remaining clues are solved in a similar manner, and it will be found that the solutions become easier as the letters represented by the code letters are discovered.

In preparing solutions there is no need to make a diagram. All that is wanted at the end is the code itself. In this the letters used in the diagram must be given in a list, and alongside each the letter that it represents, so that there are two parallel lists. Thus, for example, the list might begin with U. This we have found to represent I, and the two letters therefore should head the two lists.

As usual there are two sections in this contest, for Home and Overseas readers respectively, and in each there will be prizes of 21/-, 15/- and 10/6 for the best efforts in order of merit, with consolation prizes for other good efforts. In the event of a tie for any prize the judges will take neatness and novelty into account.

Entries in this competition should be addressed "*March Code Crossword, Meccano Magazine, Binns Road, Liverpool 13.*" Home Section, 30th April; Overseas Section, 31st October.

What Historic Locomotives are These?

The names of locomotives have always excited a great deal of interest, for the custom of giving an engine a title is practically as old as the steam locomotive itself. As the subject of our competition this month we have selected 20 historic locomotives, the names of which will be familiar to readers. These names have been mixed up, as shown below, and competitors are asked to straighten out these jumbled names, and to send the complete list in the same order to "*Historic Locomotive Contest, Meccano Magazine, Binns Road, Liverpool 13.*"

Now, readers, what are the following names?—KCTOER; TEOMC; NYNJE NDIL; NLIO; GFNIFPU LYLBI; NLOOCITOMO; ECONIUBML; LCOLARNW; EGLNADTSO; YITC FO OTURR; MWLLIIA YGLLAOWA; ED TWTI NCLIONT; DESTGUROBRI ONLI; EDR RALDE; EJESOHPIN; LGNEERA; EARTELOI; DLRO FO ETH SISEL; CRADAEN; AMRMROA.

There are two sections for Home and Overseas entrants respectively, and in each of these prizes of 21/-, 15/- and 10/6 will be awarded for the best entries in order of merit, with consolation prizes for other good efforts. If there is a tie for any prize the judges will take neatness and novelty into consideration.

Closing dates: Home Section, 30th April; Overseas Section, 31st October.

March Photographic Contest

This month's photographic contest is the 3rd of our 1946 series, and in it, as usual, prizes are offered for the best photograph of any kind submitted. There are two conditions—1, that the photograph must have been taken by the competitor, and 2, that on the back of each print must be stated exactly what the photograph represents. A fancy title may be added if the entrant desires.

Entries will be divided into two sections, A for readers aged 16 and over, and B for those under 16. They should be addressed "*March Photo. Contest, Meccano Magazine, Binns Road, Liverpool 13.*" There will be separate sections for Overseas readers.

In each section prizes of 15/- and 7/6 will be awarded. Closing dates: Home Section, 30th March; Overseas Section, 30th September.

Illusions and Disillusions—(*Continued from page 94*)

petrol or fuel-oil in a tin can and only getting about 30 per cent. of it back at the airscrew or the road-wheels after it has been through a piston-engine? You have the fuel, you put it through an expensive and heavy mechanism called a carburetter, whence it passes as gas into a cylinder to make a piston bump up and down, to make a connecting rod behave like a flail, to make a crankshaft whirl round and round, to make a chunk of metal or wood, called an airscrew, rotate and screw its way very inefficiently through the air. What a waste of labour and material. And what an illusion to be shattered by the gas-turbine.

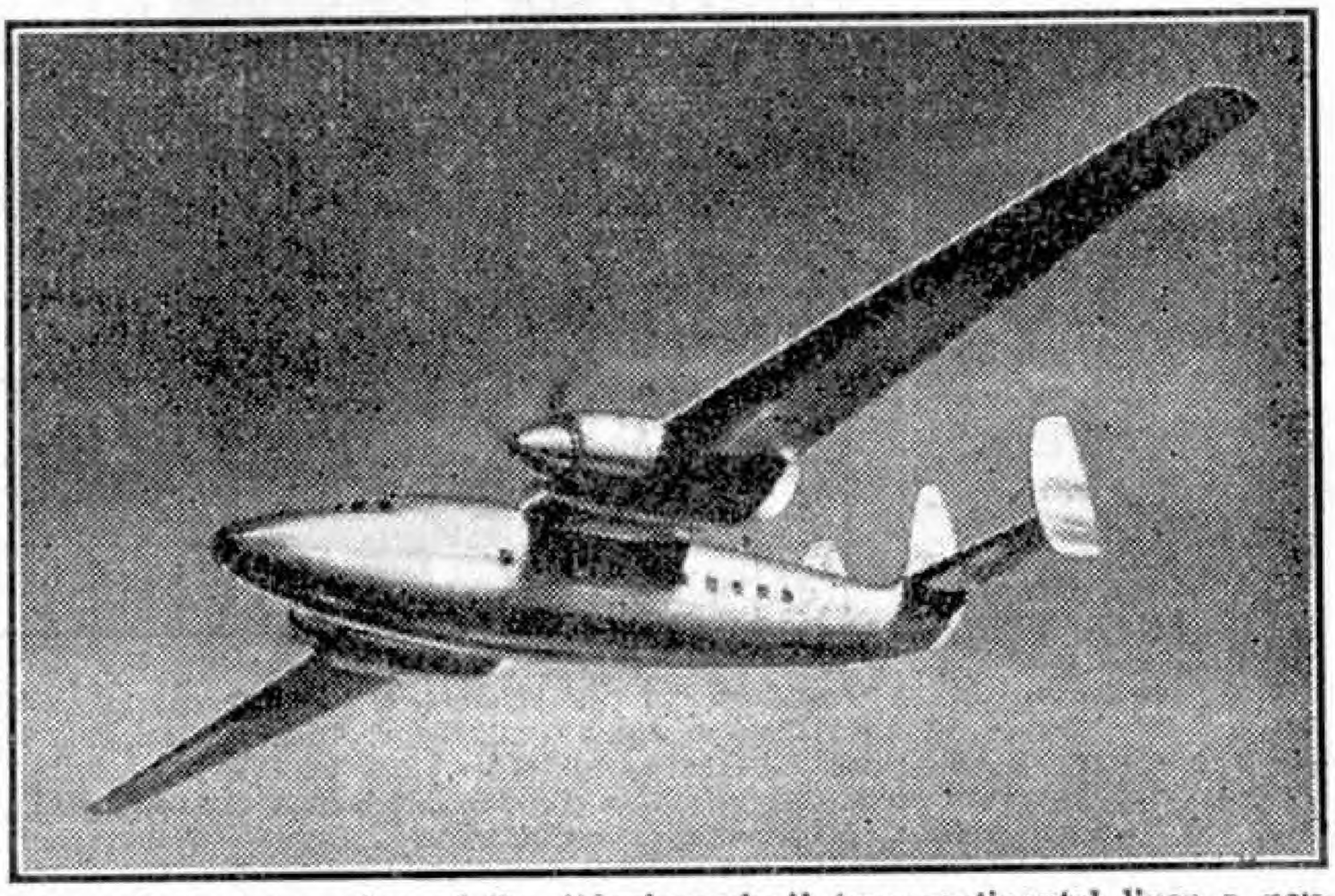
But remember that the gas-turbine still has to be developed a long way. It is a fraction of the weight of a piston engine, but it uses a lot more fuel. About 25 per cent. more was the last I heard, but that is being steadily reduced by more and more research and experiment.

Another illusion which held for years was that petrol (or gasoline) was the only fuel for aircraft. Millions of pounds have been spent on refining and blending and doping gasoline to get what is called a "high octane" fuel—that is one which gives off a gas which burns properly in the cylinder and does not detonate, or "knock." As a matter of fact the R.A.F. won the Schneider Trophy in 1931 with a fuel which had not a drop of petrol in it, and was made almost wholly of alcohol. The modern gas-turbine uses a fuel which is practically paraffin, such as one burns in a lamp. And for years heavy-oil engines (Diesel) have been running in trucks as well as in fixed power-plants.

At least ten years ago Mr. (now Sir) Roy Fedden said publicly that if he could have £400,000 to spend on development (not on research, because he knew what research could do) he would build a Diesel aero-engine which weight-for-power would be as good as the best petrol engine. But the petrol illusion, plus perhaps vested interests in carburetters, was too strong; so all through the war we have had aeroplanes which continued to burn up after a crack up. And heaven knows how many lives they have cost us.

I suppose that by the time we have got our gas-turbines and jet propulsion down to the same rate of fuel consumption per hour's flying (which may be five times the present distance in the time) we shall have learned how to use atomic energy without blowing ourselves up, and then the illusion of petrol engines, and Diesels, and jet-propulsion and all will go West together. And probably modern ideas of aeroplanes, with their shock-waves and so forth, will go with them.

But meantime, as may be seen, there are plenty of things for young scientists to discover and plenty of illusions for them to dispel. So good luck to them!



An artist's impression of the "Ambassador" transcontinental liner, a new British transport type designed, and being built, by Airspeed Ltd., of Portsmouth. It can carry from 24 to 36 passengers according to seating arrangement. Photograph by courtesy of de Havilland Aircraft Co. Ltd.

Diamonds are Trumps—(*Continued from page 101*)

liberated from the hydrocarbon. His first tubes burst with violent explosions on heating them in his furnace. Next he tried tubes bored from solid steel bars, but only three out of 80 tubes survived the tremendous pressures.

From the three tubes that survived, Hannay obtained tiny transparent crystals that looked like diamonds and were just as hard. Fortunately his specimens were put away in a London museum when he died, and recently 12 of these tiny crystal fragments were discovered tucked away there. They were submitted to the X-ray test, which penetrates below the "skin" and gives "shadow pictures" of the structure, and it was discovered that he really had made diamonds, though too small for use.

It would be a fitting conclusion to Hannay's indomitable efforts if only these diamond fragments could be joined together to form larger diamonds for industry. But when it comes to common carbon being converted to diamonds to be sold in any store, Nature calls a halt. It is just as impossible to join up these fragments as it is to melt carbon. With this insoluble problem Nature stops the play, holding a trump card with a single diamond on it—the ace of trumps in as exciting a game of wits as has been fought for a century.

Scale Models of Well-known Ships—(*Cont. from p. 115*)

of single knots and then painted the colour of iron.

A great deal of work was involved in making the large number of life-boats required for the ships. There are 41 of these on the model of the "*Majestic*" alone. To make them a piece of wood equal to the total length of all the boats was first obtained. Then the two bottom edges of the strip were rounded off and the top side was shaped to represent the taut canvas covers. The separate boat lengths were marked off and the pieces cut from the strip and the ends of each piece were then shaped with a razor blade. Finally the tiny boats were painted, and the ropes and hand-holds drawn in with Indian ink and a fine pen.

THE KENVIEW MODEL RAILWAY

The Kenview Model Railway will be re-opened to visitors at 2 p.m. on Saturday, 2nd March, in its new home, 27, Crouch End, Broadway Parade, Hornsey, London N.8. This fine miniature railway is well known to most readers of the "*M.M.*" It came into existence in 1929, and was first opened to the public on 1st November 1942, at East Finchley. Since that time more than 350,000 people have seen it, and it has been filmed three times. It has given entertainment and instruction to thousands of model railway enthusiasts, and every reader of the "*M.M.*" who can do so should pay it a visit in its new quarters. A small charge is made for admission, and the proceeds go mainly to the Hornsea Central Hospital and the Railway Benevolent Fund.

Fireside Fun

Doctor: "I'm sorry to tell you that I cannot do anything for your complaint. It is hereditary."
Patient: "Oh! In that case send the bill to my father."

* * * *

"You want more shelves for this collection of yours."
"I know! Trouble is nobody lends me shelves."

* * * *

"Are all your hens good layers?"
"Rather. Not one of them has laid a bad egg yet."

* * * *

"I saw a funny thing yesterday. A man threw a burnt match over the bridge into the river . . . . ."
"What's funny about that?"
"It lit on the water."

* * * *

Father: "I never told lies when I was a little boy."
Son: "When did you begin, Dad?"

* * * *

"Can you lend me a pound for a week, old man?"
"In a good cause, eh? But let me see your poor weak old man first."

* * * *

"Willie Thamson, yer mooth's open."
"Ah ken fine. Ah opened it masel."

* * * *

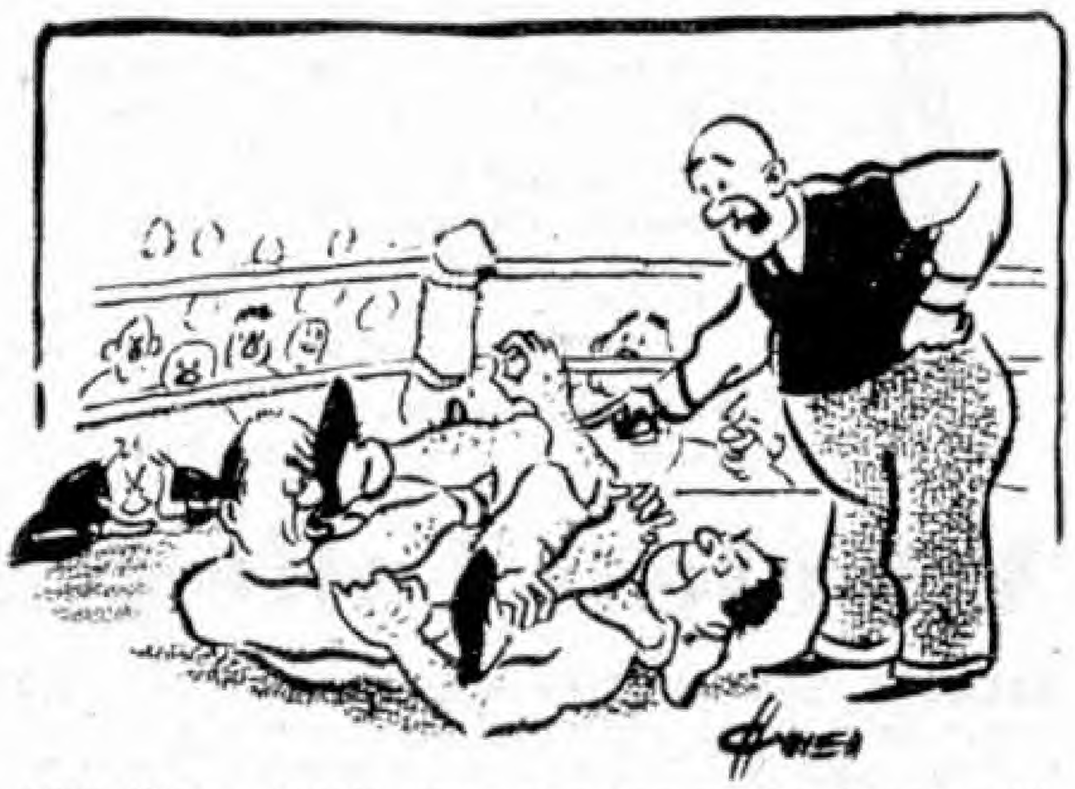
"Now, if I have a potato, cut it in two, then cut each piece in two to make quarters, and finally halve each of the quarters, what do I get?"
"Chips, sir."

* * * *

THIS MONTH'S HOWLER

Prose are men who play for money. They are quite different from poets.

* * * *

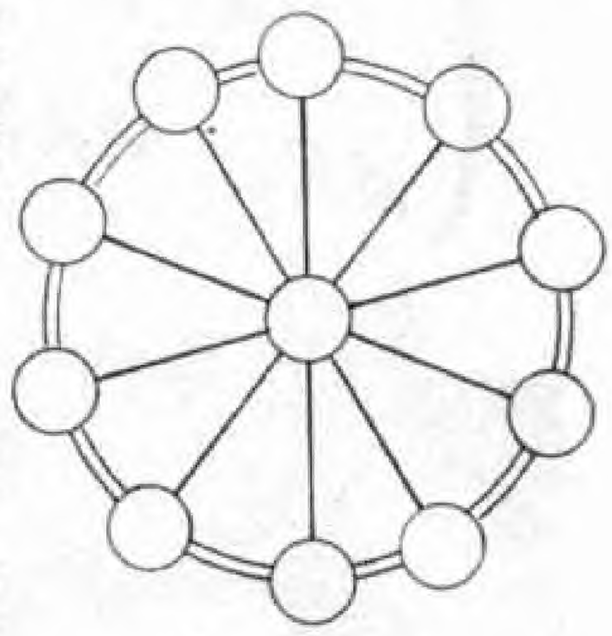


"Hi, Tiger, that's your own leg you're breaking!"

BRAIN TEASERS

MERRY-GO-ROUND

From a recent issue of "*Tracks*," the Magazine of the Chesapeake and Ohio Railway, we take this merry-go-round puzzle. In the accompanying diagram there are 11 circles. Can you place the numbers 1 to 11, one in each circle, so that every three numbers in a straight line add up to 18?



* * * *

WAS HE A SPY?

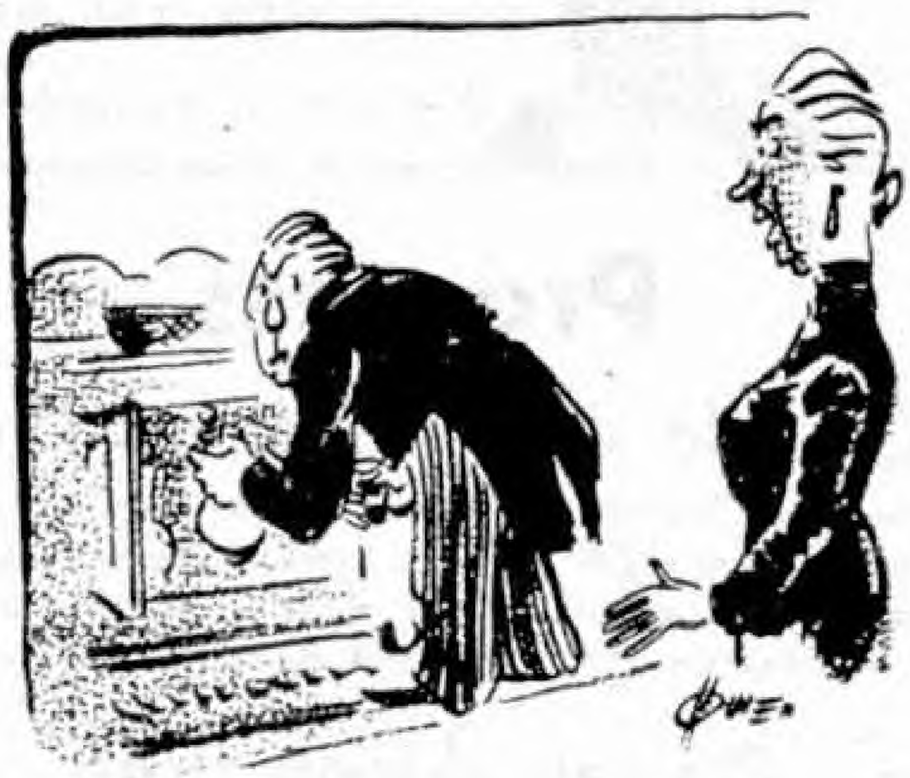
We owe our second teaser this month also to "*Tracks*." It is an ingenious cypher puzzle.

When the Germans attacked Poland at the outbreak of the war a mystery man arrested in Warsaw had in his pocket a sheet of paper, which he claimed to give the populations of certain Polish cities in which he was interested.

Here is the list: Scrawpnaw, 583,149; Dipeencef, 1,498,675; Shawket, 4,635; Kratlact, 684,371; Shronty, 54,362; Bieringo, 437,586.

The story was manifestly absurd, as there are no large Polish cities with these names, but what did the list represent?

* * * *



"Perkins! I am surprised!"
"So am I ma'am. I thought you were out."

* * * *

WEIGHING WITHOUT WEIGHTS

The owner of 12 identical medallions had a suspicion that one of them was really a fake made of light metal. He could only test them by weighing them, and unfortunately, although he had a balance, he had no weights. How could he track down the counterfeit in three weighing operations?

* * * *

SOLUTIONS TO LAST MONTH'S PUZZLES

The countries and features in our first puzzle should be as follows: New Zealand, Mt. Cook; Egypt, Pyramids; Spain, The Alhambra; Mongolia, the Gobi Desert; Greece, The Parthenon; United States, The Golden Gate; Turkey, the Golden Horn; South Africa, The Veldt; Eire, Phœnix Park; Brazil, Sugarloaf Rock; Canada, the Plains of Abraham; Scotland, Granite City.

When we add together the fractions representing the oak, elm and ash trees in the wood of our second problem we find that 13 out of every 60 trees are poplar. These number 104, so the total number of trees must be 480; the number of elms then is 120.

STAMP ADVERTISEMENTS

(*See also pages 122 and 124*)

MECCANO MAGAZINE

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Small Advertisements. 1/8 per line (average seven words to the line), or 20/– per inch (average 12 lines to the inch). Cash with order.

Display. Quotations for space bookings, and latest net sale figures, will be sent on request.

READERS' SALES AND WANTS

SALES

35 mm. Cinematograph Films: Cowboy, Comedies, Cartoons, etc.; 100 ft. 3/6, 250 ft. 6/9, 500 ft. 12/6, post free.—Jones, 51, Cranford Drive, Hayes, Middlx.

Hornby Rolling Stock; Rails; Points. Bassett-Lowke 3 ft. Radius Points; Gauge 0; Clockwork.—Cottrell, 31, Gresham Road, Hall Green, Birmingham.

Variety Meccano Parts; send stamp for details.—Gainford, 5, Bristol Street, Barrow-in-Furness.

Two Self-Contained Outfits comprising comprehensive Assortment of Meccano, including 370 Angle Girders; 200 Gears; 2,000 Nuts and Bolts; Motors; and Large Selection of other Parts. Individual Parts are not for sale. Particulars available to interested parties sending 3d. in stamps.—J. M. MacLaren, Abbey Manse, Jedburgh, Roxburghshire.

Hornby Tank Loco., Gauge 0, Clockwork; Five Goods Wagons and Brake Van; also Nine 18 in. Made-up Rails; £3/10/– or nearest offer. Apply evenings to—A. Rothwell, 6, Westbury Road, Wembley, Middlesex.

"Gibbons' Stamp Monthly," Oct. 1927–Oct. 1935; Oct. 1937–Sept. 1938; good condition; best offer over 15/–.—Teatherton, 41, Mount Road, London S.W.19

Collection of 1,500 different Stamps in Album; value £10; will accept £5. Also large Chess Set, polished with Velvet bottoms; as new; £5.—J. Marsh, 35, Vale Road, Winchester, Hants.

WANTS

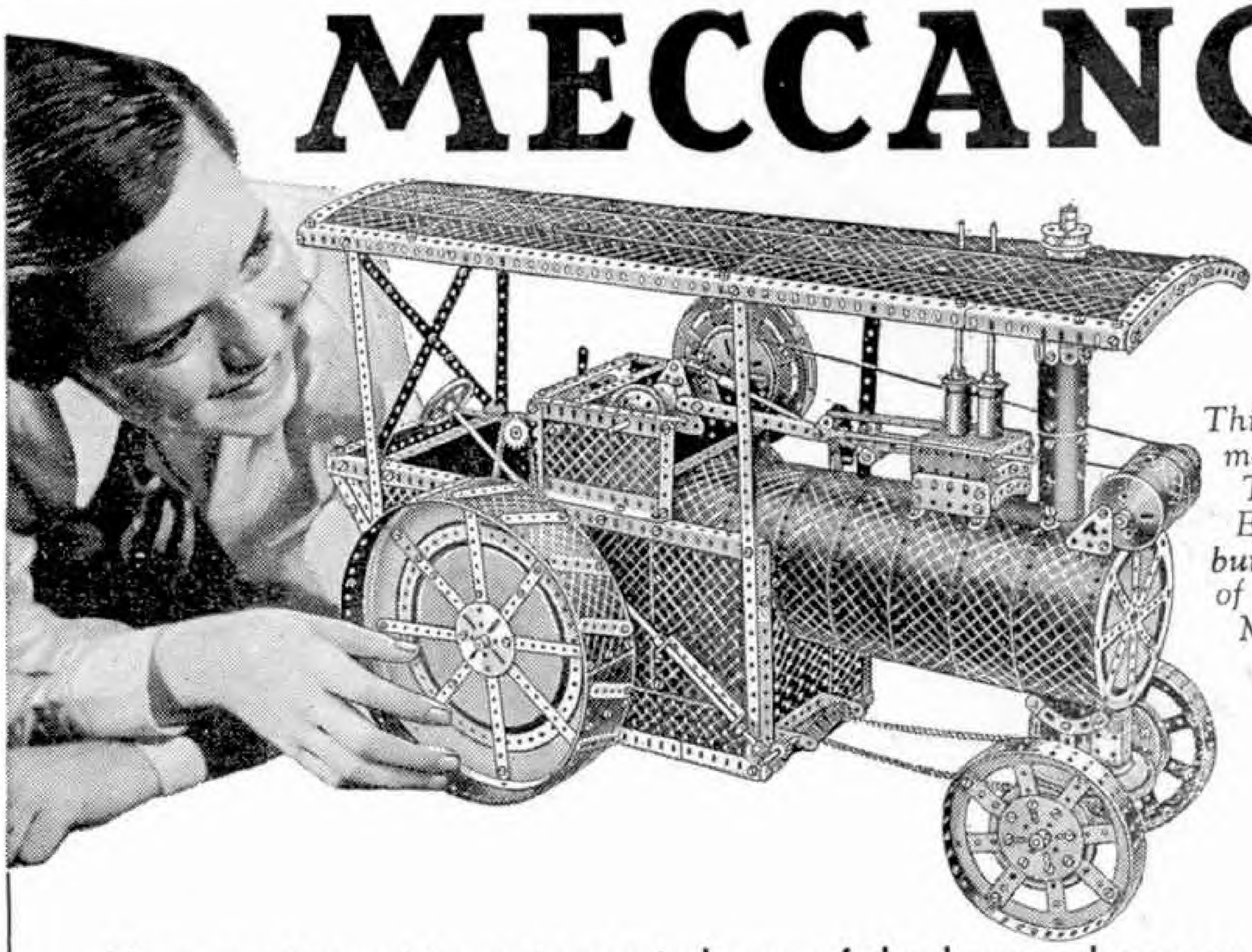
L.M.S. No. 2 Special Standard Compound Loco., Gauge 0; state price and condition.—Dixon, 51, Ormeau Road, Belfast, N.I.

Good condition Clockwork Goods Train with Accessories; price £3; state details.—J. Spackman, 110, Holmesdale Street, Grangetown, Cardiff.

"Meccano Magazine," January 1943; state price.—"Clingre," Busbridge Lane, Godalming, Surrey.

Will Exchange Hornby 0–4–0 Reversing 0 Gauge Loco., Rolling Stock, Signal Box, Station, 18 Curved, 13 Straight, Pair of Points, Pair of Parallel Points, all 2 ft. Radius and Transformer for Same or Near, in 00 Gauge.—Jones, 32, Princess Street, Tunstall, Staffs.

MECCANO

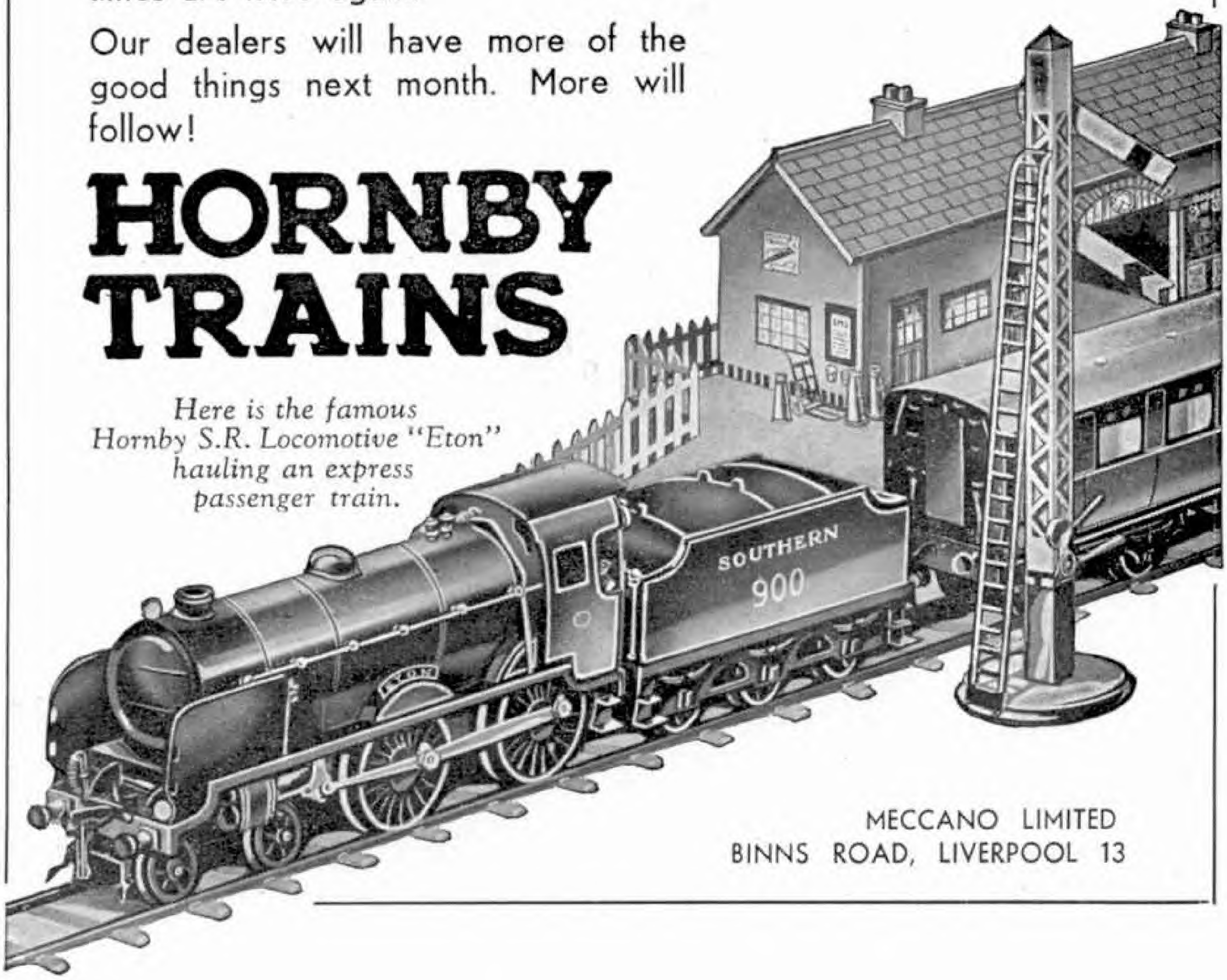


This splendid model of a Traction Engine is built entirely of standard Meccano parts.

Here are two pictures to remind you of the happy days you used to have before the war. It will not be long now before the good times are here again.

Our dealers will have more of the good things next month. More will follow!

HORNBY TRAINS



Here is the famous Hornby S.R. Locomotive "Eton" hauling an express passenger train.

MECCANO LIMITED
BINNS ROAD, LIVERPOOL 13

MECCANO

DINKY TOYS

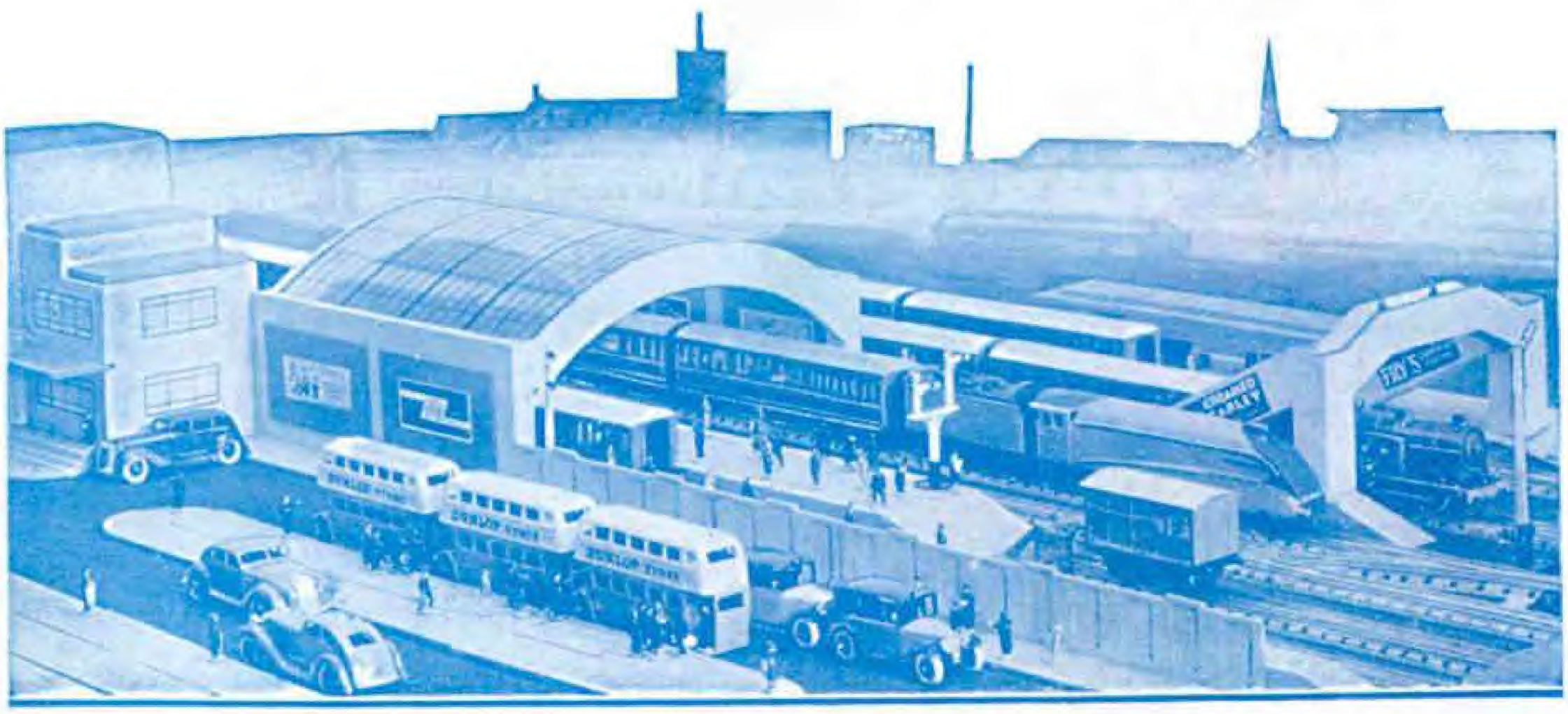
HORNBY TRAINS

DUBLO TRAINS

If you have STILL not had your share of Meccano and Dinky Toys, don't despair. Your dealer will have further supplies next month.

Obtainable ONLY from Meccano dealers.

MECCANO LIMITED - BINNS ROAD - LIVERPOOL 13



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